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- ☑ For Beginners — Setting up a Workshop

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# Contents



**The Cover**

***Brian Carter's 5" gauge S.R. & R.L. caboose 556 on its maiden run at the SLSLS track at West Ryde on 14 March 1998, the weekend prior to the club's 50th anniversary weekend steam up.*** ***See page 34 for more details.***

Photo: Brian Carter

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# Comment

## We really do care, don't we?

You know, when you look around at model engineers and their hobby, they are a caring lot, usually willing to help others, sometimes at considerable inconvenience to themselves.

I have no trouble in calling to mind examples of people who have spent hours trying to sort out a problem which another builder has encountered and which has, to him, become impossible to overcome. These people are prepared to spend time when they could be working on their own projects, nurturing someone who is new to the hobby, and who has it all to learn. There are those who have well-equipped workshops and who are willing to make use of their equipment available to club members who do not have much. All these people are the real asset of the hobby, and no doubt many of us owe our present involvement to such a person. I know that I probably would never have got started had it not been for the assistance and encouragement one such person gave me.

What about at the club level?

One advantage of receiving club newsletters from many sources is that you get a fairly clear understanding of what is happening in the general club scene. There are many examples of this same caring and sharing at club level. At the moment I can think of one club which is making sleepers for another which has a large amount of track-laying in front of it. There are the clubs who donated some of their hard-earned funds to help another club recover from the results of vandalism in which their track was all but destroyed, and another club which made its facilities freely available to the members of that club while their track was rebuilt. There are the clubs who lend other clubs equipment like track laying machines, jigs and so on. These are only a few examples.

Perhaps there is scope here to go a bit further and pool resources. This would be an excellent way to further spread the enjoyment we derive from this great pastime. There will always be clubs who have done well over the years, usually through a lot of hard work by their members, as well as being able to take advantage of certain opportunities over the years, and there will be clubs who have a rough time of it, for reasons of location, socio-economic factors and so on. Pooling of resources would, in many cases, help these struggling clubs become better established and increase the pleasure their members get from the hobby. For the donor club, members would have the satisfaction of a job well done added to the bonus of extra venues to visit and operate their favourite models.

Perhaps this pooling of resources could be extended to include patterns and drawings. Perhaps some major undertakings could become joint ventures between clubs. The scope and the opportunities are enormous. What do you think?

After all, we all have one common aim — to enjoy ourselves and have fun.

*David Proctor*

## Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Roundup to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

*Helping other model engineers* is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.

I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!

*David Proctor*
Managing Editor

# TRACKS IN THE SUN

## A QUEENSLAND PERSPECTIVE

*Produced & Directed by Mike Condon, Express Train Video*

Queensland Rail is probably Australia's most exciting rail network. Nowhere else can such diversity be easily delivered by one rail network. Giant coal trains at least 1.6 Kilometers in length race from mines to port facilities, whilst express freighters link Queensland's major cities. In contrast to these scenes Queensland Rail still supports long distance passenger service and an extensive urban passenger network. However, by far the most remarkable aspect of the network is the retention and expansion of its steam heritage operations.

*Tracks in the Sun,* a Queensland perspective, is a collection of stories that feature steam, diesel and electric operations. All six steam locomotives from the Steam Heritage Fleet are included in this program. A key feature of this program is a story of A10, No.6, one of the oldest locomotives operating on a mainline network anywhere in the world.

Operations on a *Now Closed* branch line with a diesel locomotive from a now withdrawn class form a stark contrast with the giant electric hauled coal trains of Central Queensland. Almost a distant memory, the Brisbane Valley Branch is featured via one of the last steam tours on the branch during 1989.

Steaming through the suburbs DD 17, 1051, at the head of a suburban coach set recreates the atmosphere of Brisbane suburban operations of the 1960s.

There's even a story on the soon-to-be-introduced high speed tilt train. The train has been filmed at the Walkers Ltd's test centre as well as out on the mainline.

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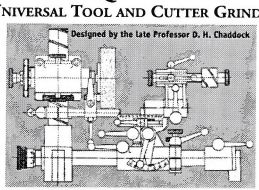


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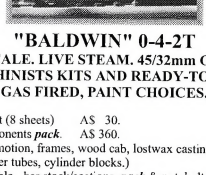

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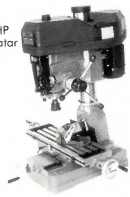

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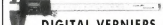

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# Steam Driven Generator

## (Plus Headlights and Cab-lights)

**by John Couchman**

*Drawings for publication by Jim Gray*

Many modellers have difficulty obtaining "off the shelf" steam turbine driven generators to suit their particular requirement. I decided to build such a unit as an experiment and to test the outcome on Doug Chamber's *Wren* locomotive, using a battery drill motor as the generator. *(other motors of appropriate sizes could be used ... Ed.)*

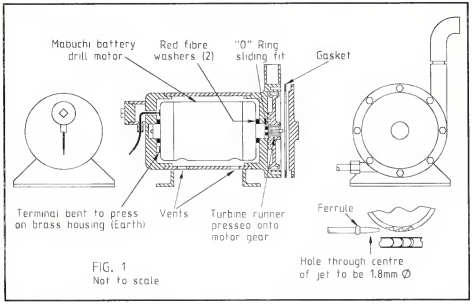



FIG. 1
Not to scale

In the initial stages, with the temporary set up, all worked well until steam found its way along the shaft bearings and condensed inside the end cover of the DC generator. I had foreseen this happening and drilled a driphole through the lower surface of the housing.

Later another model engineer, Richard Lockart, fitted a tiny "O" ring and from all reports it worked well. The President of our club, Chris Morton, carried out load tests at various pressures and these are documented at the end of this article. Now we were, or at least, appeared to be progressing — the next feature was the fitting of voltage regulator inside the head light housing.

### Design

Deciding on the output was established by connecting two 6 volt lamps in parallel to the generator and spinning the armature up to speed using a strobe to check out full load speed at the boiler working pressure. I used compressed air in the early trials.

### Construction

From previous experiments with turbines, I decided to machine out a 52mm dia x 7mm wide wheel face from a brass disc (stump type turbine). The runner periphery was machined in the vertical mill and dividing head into 24 end mill cuts (see drawing).

At this point I pressed the runner onto the generator shaft together with 2 bulbs as the given load, and then experimented with made up steam jets (again using air) to establish the correct diameter jet and distances from the turbine. Having established such dimensions the housing followed.

Back to the drawing board where generator housing and turbine enclosure were drawn to critical dimensions.

**FIG. 1** should guide the builder through housings and assembly.

**FIG. 2** provides the general arrangement for lights.

On cold nights we found condensing steam causing problems with track vision. To overcome this problem a short exhaust extension with a right angle outlet was fitted. This can be a push fit, screwed or Loctited® into the turbine exhaust. Lamp holders used were purchased from a *Dick Smith* electronics store. (description "ME" socket with mounting slot) Solder type to suit.

The advantage of using the above lamp holder type is that the slot enables one to adjust head light focus by the horizontal movement of the holder.

### General

For modellers who require a more mathematical approach to subjects like turbines and nozzles, covering steam velocity at nozzle, M/sec viscous drag, calculating nozzle diameter and profiles, such data is found in a good library (see references).

High speed stainless steel bearings are a great advantage, say "ZZ" type with one or

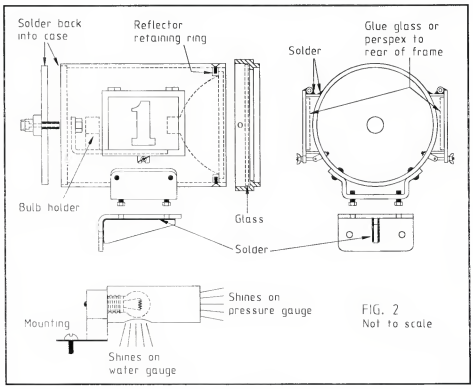



FIG. 2
Not to scale

both seals removed and lubricator with a 3 in 1 lube or a mix of kerosine in oil (SAE30).

In previous generators, I removed both seals and arranged bearings away from the steam side. Maybe more on this later.

## References


*Model Steam Turbines* H H Harrison (1991)

*Heat Engines* John R Allen & Joseph A Bursley (McGraw Hill, 1941)

*Reed's Heat and Heat Engines for Marine Engineers* William Embeton (Thomas Reed, London)

For general knowledge (and a favourite of mine):

*Reed's Practical Mathematics Vol 11 — Applied Mathematics for Marine Engineers* W. Embeton. (Thomas Reed)


## Conclusion

I look forward to articles in AME from other modellers expanding on this simple quick and effective turbo generator to assist others with similar interests. With experimental work, perfection only comes from others input to the tack.


My sincere thanks to Doug Chambers, Richard Lockart and Chris Morton for support and constructive ideas.


**Chris Morton's test figures**

| Boiler Pressure (lbs per sq. in.) | Voltage | Amperes | Watts | Load Resistance |
|---|---|---|---|---|
| 85 | 6 | 2.8 | 16.8 | 2.14 |
| 75 | 6 | 1.8 | 10.8 | 3.33 |
| 60 | 6 | 0.9 | 5.4 | 6.66 |

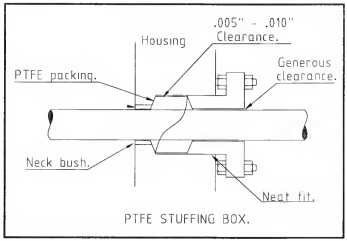
# Teflon Glands

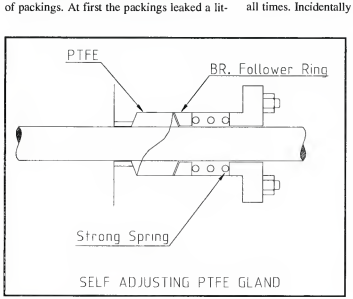
### by Ted O'Brien

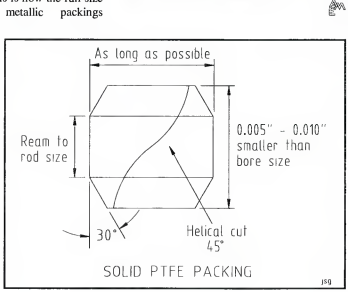
*Drawings for publication by Zenon Zalewski and Jim Gray*

Quite a few articles have been written about this wonder plastic, but I think this is a new application. Having worked most of my life in and around plastics and plastic machinery resulted in my being rather conservative when it came to plastics in engineering. Recently whilst helping a friend build a locomotive, it was my job to pack the valve and piston rod glands for which I had some ⅛" square teflon coated yarn. After doing one side of the locomotive I ran out of packing, so I thought quickly and turned up some solid packings for the other side glands. They were made to a reamed fit on the rods but with .010" clearance on the O.D. — that is between the packing and the housing bore.

Naturally I kept quiet about this little trick and subsequently forgot about it. However some months later my friend informed me he had not touched the solid packings side, but had slightly adjusted the other side twice. He was informed of my dirty doings and we closely observed the behaviour of both types of packings. At first the packings leaked a little water but after a few minutes sealed up and never leaked for the rest of the run. I was converted at least for PTFE for glands. Since then I have used nothing else. Some are solid like a straight bush others are cut helically over a piece of shaft so that they may be peeled off and replaced when worn out, but I doubt that they will ever be replaced in my life time. They have since been fitted to a 1½" scale air compressor and to locomotive cylinders and valve chests. The latter have cut packings with a solid follower ring and strong springs to keep the adjustment on the glands even at all times. Incidentally this is how the full size metallic packings were arranged on modern steam locomotives, so nothing is new here. I find that I now put Teflon in everything even in my whiskey as it helps it to slide down my throat even though it doesn't need any encouragement.



# Grand Opening at Grandchester

**Story and photos by Dave Harper**

On Saturday 1 August 1998 the new club track at Grandchester, west of Ipswich, Queensland, was officially opened by Cr Nugent, Lord Mayor of Ipswich.

Grandchester, originally known as Bigge's Camp, has a revered place in Queensland's railway history; it marked the end of the first section of railway built from Ipswich back around 1860.

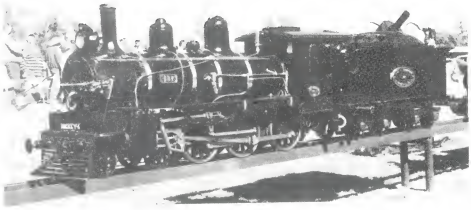


**Photo 3**


**Photo 1**

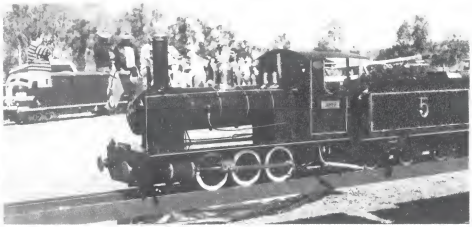


**Photo 4**

Grandchester is today also the home of one of the very few remaining steam powered sawmills still in commercial operation. It's no coincidence that Jeff Gillam, President of Grandchester Model Live Steam Association Inc., is one of the family that operates the sawmill, and that the track is situated a stone's throw from the sawmill!

With a current membership of 26, the club has done very well to lay a substantial circle of 7¼" and 5" dual gauge track with a covered steaming bay, a very well engineered turntable with hydraulic loading ramp, plus passing loops etc. by the station, all since the club was formed in 1994.

The next stage planned includes a large double track steel bridge over a creek and a loop around the remaining area of the club grounds. However, the existing track provided plenty of scope for the 20 plus locos that turned up from as far afield as Richmond River in NSW. The assembled public certainly seemed keen enough to ride as the queue at the station never seemed to shorten all day!

**Photo 2**


Photo 5

Photo 6

Entry to the track is through an impressive gateway formed of two old signal towers; the old signal box from Yarongmulu has been relocated and restored as a clubhouse, and the whole setup was very well organised. (**photo 1**)

Cr Nugent performed the official opening at 1pm with the TV cameras whirring. After cutting the ribbon the official train headed off led by Jeff Gillam's PB15 *Mickey G*. **Photo 2** shows the official train and **photo 3** is a better view of the PB15.

Among the colourful locos present were Barry Potter's bright red Blowfly *James*, and Merv Feine's yellow 0-6-0. (**photos 4 and 5**).

The well-engineered turntable is shown supporting Ian Scott's PB15 in **photo 6** and the most impressive machine on show was Jim Organ's NSW class 44 diesel. This massive engine is powered by a Ford Cortina engine with automatic gearbox, with all the controls brought out to an impressive control panel on the riding truck (**photo 7**).

Jim hauled this ¾ ton model all the way from Richmond River, NSW, and was pleased to tell anyone about the new club they have just formed down there!

The whole day ran very successfully, even the weather turned out beautiful after several wet days preceding it; the Grandchester club are to be congratulated on their efforts. I certainly appreciated the hospitality shown to me, and it was a pleasure to see all the familiar faces from Bribie MELSA and QSMEE again.

Photo 7

# Setting Up A Model Engineer's Workshop — part 1

**Story and photos by Steve Reeves**

*Drawings for publication by Peter Shute*

This series of articles is designed to answer the questions — *What is the ideal workshop? What should the newcomer look for? What will they need to get started in the hobby?*

The answers will depend on two things. First, which aspect of the hobby do you wish to work in. The making of a miniature boat, plane or car will require different skills and crafts to that needed to make a steam engine. A kit of parts will require hand tools for instance, while building something from scratch will require machinery as well.

The second thing you need to ask yourself is what scale are you going to work in. This series of articles is designed to help those wishing to build from scratch, things like stationary steam plants, road vehicles, railway locomotives and similar sorts of items. For these, machinery will be required. The scale determines the physical size of the components and thus effects the size and type of machinery and tools you require. For example, the coupling rods for a 25mm scale, 3½" gauge railway steam locomotive may only be 6mm thick x 125mm long. This can easily be made using a hacksaw and files. In contrast a 7¼", 100mm scale locomotive may have rods that are 16mm thick x 300mm long. At this size you are reaching the limit of what hand tools can do particularly if you expect your project to be completed within 2 to 3 years of starting it. Machinery will both reduce the time and physical effort required, thus increasing the enjoyment. This of course effects the cost and the size of your workshop.

The first step therefore, is strike a balance between the size of the project and the cost of putting together a suitable workshop to build it. Remember the bigger the project (ie. physical size of the components) the greater the cost and the longer it will take to make.

## My workshop — a brief history

For myself I have chosen the field of miniature railway steam locomotive construction in the 50mm to 100mm scale at 7¼" gauge. I have also built various smaller projects ( steam pumps stationary engines etc). It all began about 20 years ago in my father's garden shed. This measured about 4m x 8m of which about half the floor space was available. Yet I was able to build a 3½" gauge *Tich*, overhaul a 7¼" gauge vertical boilered engine and maintain a 5" gauge 4-6-2 tender engine. Since then I have moved into my own home which has a large workshop measuring 18m x 20m. Locomotives of 7¼' and 5' gauges are under construction and believe it or not, I have out grown the available space and some things are being stored out side! Under cover of course!

These articles are about my experience with these workshops and what I have learnt so far.

## The lathe

The centre point of any workshop because of its versatility, the lathe will probably be your biggest capital outlay. It should therefore be the first machine you purchase. Why, may you ask? This is because a lathe can do many things. It is a milling machine, drilling machine, thread making machine, as well as doing all the turning jobs. Thus you have 3 or 4 machines rolled into one. I know of one engine builder that has a lathe as his only machine tool!

I have two lathes. The first is a Myford 10. It was purchased within a year of first starting full time work and before I purchased a car! It was the last of its type sold by Atkins Carlyle in Fremantle, as the new Asian machines were beginning to come onto the market and at a price which couldn't be competed with. A great pity as this machine is the Rolls Royce of lathes and 20 years down the track, it is still as good as the day I first purchased it. With a centre height of 89mm and maximum distance between centres of 330mm it will handle parts for 3½" gauge locomotives and smaller.

When I purchased my bigger lathe I did not trade in the small one as I have kept it for

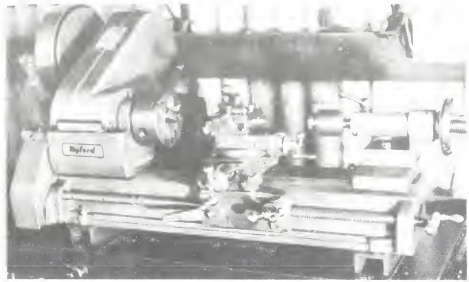
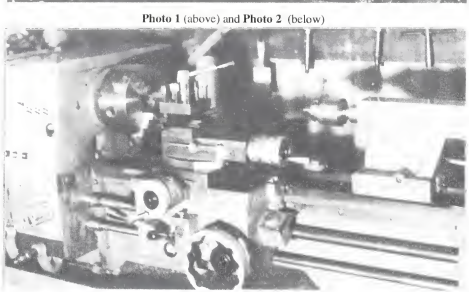



**Photo 1** (above) and **Photo 2** (below)



all my precision work such as the cones for injectors and ejectors, whistles and other components requiring accurate machining tolerances. **Photo 1** shows what the lathe looks like.

With the move to 7¼" gauge, a bigger machine is required. Today the Asian machines have the market place and they come fully equipped, ready to use. I took the time to shop around and buy new. I settled on a Herless 1236 gap bed lathe. This machine has a centre height of 305 mm and a distance between centres of 915mm. I really needed a bigger machine than this for wheel turning but felt the cost did not warrant it so the gap bed allows me to use a smaller machine for general machining and a small part of the lathe bed can be removed to allow the larger size components to be machined. This has proved a good machine and does all my heavy turning jobs. **Photo 2** shows this machine on the stand it came with.

## Lathe tools

On the Herless lathe I use *tip tools* mounted in a 4-way turret. Tip tools can be operated at higher temperatures, so a much higher chuck speed and turret feed rate can be used. For example, I can take 3mm cuts when roughing out. Then I get a fine finish by using a tip tool with a sharper point (smaller radius tip). To get an even better finish *tool steel* is used

FIGURE 1 ROUND NOSE TOOL
For contour turning and fine finishes.

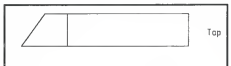


FIGURE 2 KNIFE TOOL
For facing off and parallel turning.
Can leave a scratchy finish if not honed correctly.

FIGURE 3 CHAMFERING TOOL
For removing sharp edges.
Making cones or olives.

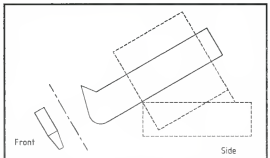


FIGURE 4 PARTING OFF TOOL
Angled blade type works better.
Dotted lines show tool holder.

With the Myford I prefer tool steel as, although tip tools could be used here, they do make the lathe work harder thus placing more load on the bearings. These tools are also in a 4-way turret and I use the following tool configurations as shown in the sketches. **Figure 1** shows a *round nose* tool, **Figure 2** a *knife tool*, **Figure 3** a *chamfering tool* (set at the same angle as a centre drill), **Figure4** *parting off tool* and a selection of *boring bars* in **Figure 5**.

Each tool type must have clearance between the tool and the work you are machining (**Figure 6**). Now there are books on the subject that tell you what angle to use for the different types of metals and I recommend you purchase one and follow the guide lines it sets out.

It is important to keep your tools cool. This increases tool life, reduces wear and tear on your lathe and gives a better machined surface. For the small lathe I bolt a small tank, with tap and spout, onto the cross slide which drips the coolant onto the work. The drip tray has a drain hole at the lowest point. An ice cream container catches the drips and that way the coolant can be recycled. For very small jobs, I use a separate squeeze bottle. The bigger machine of course uses a pump in a tank, which was purchased with the machine. It is also shared with the mill drill. Tank capacity can be increased by connecting it to a 20 ltr plastic container, which has the advantage that all the coolant can be stored in a safe place (important if you have kids) and gives a longer life due to less evaporation. Today there are many different types of coolants available, and everyone has their own ideas as to which is the best. Basically it should have a good shelf life once mixed, does not stain the lathe surfaces and contains some form of antiseptic properties to protect those small cuts etc. you get on your hands and arms. Talk to your local supplier as they can advise on what's best. Tell them your work habits, type of materials being machined, types of tools and speeds, and how frequently you will be using it.

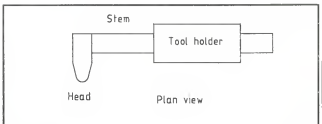


FIGURE 5 HOME MADE BORING BAR
For machining accurate concentric holes.
Note. The head is the same as a round nose tool.

Standard accessories for a lathe include a face plate, 4-jaw chuck, 3-jaw chuck, a live centre (ie. it rotates), and a dead centre for the tailstock, a drill chuck up to 10mm (small lathes), 19mm (large lathes) and a boring bar. Vertical slides and even milling heads can be purchased if you don't need a milling machine and require only light milling operations, thus saving you money. Collets are another good buy but they are pricey and may not warrant the extra expense. (Depends on how accurate you want to be). Tailstock die holders are another good investment as they insure a thread

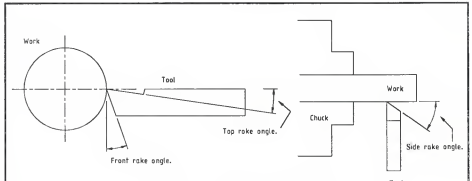


FIGURE 6 CLEARANCE FOR TOOLS

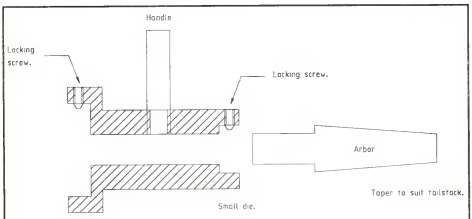



FIGURE 7 HOME MADE DIE HOLDER FOR THE LATHE

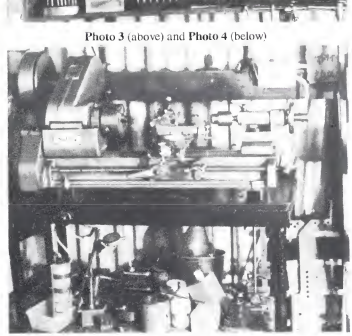
is tapped concentrically. For the model engineer type dies (BA, 40 and 32 tpi) I have made my own as shown in **Figure 7**.

All my lathes sit on their own stands which raise them to a comfortable working height. If your workshop has a concrete floor, make up a wooden mat (or even some soft carpet with thin foam underlay) to stand on. A cold hard floor gives very sore legs, and working at the wrong height can give back pain as well as sore arms. You don't realise it at the time, but once you have finished for the day and have gone inside, it doesn't take long for the pain to start. So take the time to get it right for you.

**Photos 3 and 4** show two methods of storing lathe equipment. The shelving that sits above my small lathe carries all my light-weight tooling including other hand tools. All the heavier gear is stored on the shelf below. Note that everything is easy to reach. See where the chuck keys are placed.

Note the light in **photo 3**. Never use fluorescent lights as the main source of light above moving or rotating machinery. This is because of what is known as the Stropicfobic Effect. Lights using mains power (250V ac) actually turn on and off 50 times a second. This is too fast for your eyes to see, but if the work is turning at 50 revs/min or a multiple of 50, then it looks like it is not moving at all. So if you are tempted to touch, you know what the result will be. Accidents in industry due to this effect are numerous. The problem is solved by using a incandescent light (ie. a normal house light globe). It too also turns on and off but it takes time for the element to cool down during which it is still glowing. So it is still giving off light during the off period. Thus it does not accurately turn off like a fluorescent light does. The work can easily be seen as rotating. My light is a small desk lamp (with the legs removed) that was bought from the supermarket. I have seen home made ones using tin cans as the lampshades (which are electrically isolated to prevent electrifying the user), and the professional type which sit on the end of movable arms. I use 40 Watt clear globes which stop overheating of the lamp shade and glare caused by light reflecting off shiny machined surfaces. I have also found that the type designed to point light downwards instead of in all directions (known as diffused light) tends to cause shadows, thus effecting your ability to make things accurately with good finishes.

**Photo 3** (above) and **Photo 4** (below)



## The bandsaw

If you find you are cutting material over 20mm in diameter or thickness on a regular basis, then a bandsaw will be required. I use a bandsaw instead of a power hacksaw as I find these machines more versatile. On a bandsaw the head can be set up in the vertical position so that profile cutting can be done. An example of what I mean by profile cutting is the signal arm off a semaphore signal. This has a rounded head at one end and a dovetail at the other end and is 5mm thick. With the special table attached, which came supplied with the machine, it was cut by hand, manoeuvring the work around the blade. When doing this type of work be very careful how and where you hold the work with your hands, otherwise one slip and its goodbye fingers. If it is at all possible clamp the work to a piece of wood and hold the wood. The work can also be pushed by the wood. That way if you do slip, it will be the wood not your fingers that touch the blade.

These machines are not expensive to buy so you can afford to buy one new. I use a blade with 18 teeth per 25mm and run it at the slowest speed available. You should be able to get about 50 hours out of the blade and will cut all types of metals of any shape or size, up to 50mm height by 100mm wide. Do not overload the blade by pressing down on the head, or by adding weights to the head. If the machine is cutting slow, the blade is either clogged up, blunt, running at the wrong speed, or the material is simply to hard for the blade to cut. Find out which is the cause instead of losing patience. These simple precautions will save you hours and hours of cutting time (not to mention blades!). What's more, you can have confidence in your machine and leave it to do the work while you get on with something else.

**Photo 5** shows mine (in the horizontal position), which is pretty much a standard design and configuration used by many manufacturers. It is belt driven with 3 speeds and has wheels at the base which enable you to move it around.

## The drill press

The next most used machine in the workshop. As the name implies, it is used for drilling and counter-boring holes. With the motor

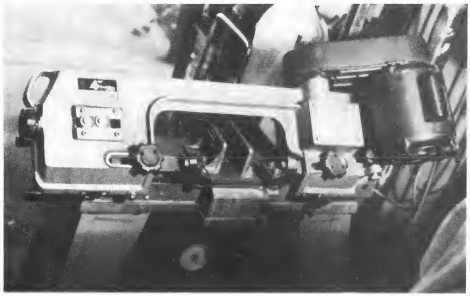


Photo 5

disconnected it can also be used as a tapping machine, thus keeping threads square and concentric.

There are two basic types and they can be purchased with either a round or square table. I chose a bench version as it brought the work to be drilled to a comfortable working height and the machine is also semi portable (although two people are needed to lift it). As can be seen in **photo 6**, I use the round table version. This gives a much larger surface area to work on which means the work can be held in a more stable manner. I have modified a selection of clamps to fit in the slots as it is imperative you hold down the work while drilling. This is an absolute must from 6mm drills upwards as it is not only your fingers, but your whole hand that can get caught.

For small jobs I use two different size machine vices (seen at the bottom of the photograph). If you have long hair then it must be tied back out of the way and held in a hair net. Safety glasses should also be worn to protect the eyes from flying swarf.

My drill press has 12 speeds and is belt driven. It uses a 16mm chuck although a larger one could be fitted if required.

## Grinders

**Photo 7** shows the two grinders that I currently own. They have both been placed on a home-made stand which brings them to a comfortable working height. The grinder on the left was my first purchase. It is fitted with a course wheel on the right hand side, and a fine wheel on the left hand side, both 150mm diameter. It is used for sharpening and shaping of the tool steel used on the small lathe. This grinder proved to be under-powered for the work asked of it so the larger one on the right was purchased. This is similar to the type used in industry — motor size is 185 Watts and uses 200mm diameter x 25mm wide wheels. Like the smaller machine it is fitted with course and fine wheels for use on tool steel.

In the future I will be upgrading the smaller unit with a bigger one. This new machine will have a fine wheel for sharpening my tip tools (parting off tool) and a buffing wheel for polishing (eg. brass domes).

When grinding always use the front of the wheel, never the sides. The wheels are designed for front pressure only. Side pressure can shatter them. Believe me, you don't wont to be anywhere near a wheel when it shatters! Similarly do not grind any soft metals such as copper, brass, aluminium or plastics. This causes heat to build up in the wheels and they will shatter. When grinding always move the work across the surface of the wheel from side to side. This will ensure the wheel wears evenly without rounded corners and hollow places. A wheel dresser can be purchased to clean up a wheel that has worn unevenly. So far I have had the large grinder for six years. It is used regularly and shows very little sign of wear, due to following these methods, and a good finish is always obtained.

Don't allow the work to get hot either. Apart from the obvious point of burning your fingers, you run the risk of over heating the wheel which may shatter it. Also you start to normalise the work causing it to go soft and therefore useless to cut metal. Keep a cup of water handy.

Attachments can be bought for grinders such as linishing belts, wire wheels (for removing rust and for paint preparation), as well as other odds and sods. All these things of course increase the versatility of your machines.

## Mill/drill

To some people owning a machine that can perform milling operations is considered a luxury item. When you consider the capital outlay, who can blame them. Yet as you start to work on larger projects (¼ scale or larger) a milling machine is a must. So when it came to purchasing one I got quite a shock. At that time, a new machine cost four times what I payed for my large lathe! So what are the alternatives?

*To be continued ...*

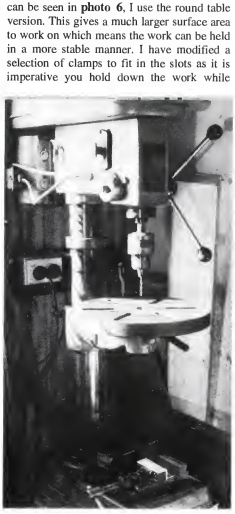


Photo 6

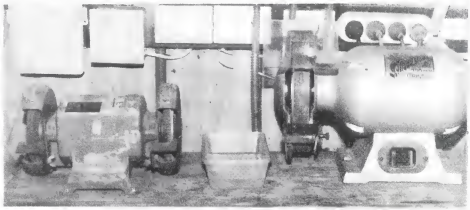


Photo 7

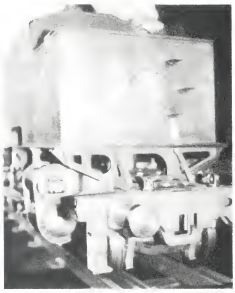
# Garratt Gossip

## with John Cummings

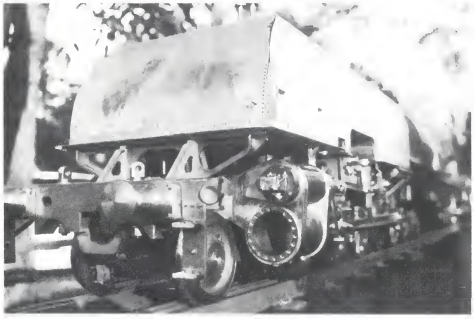
Since my last *Garratt Gossip* in the March-April issue, my wife and I have driven to Bunbury WA for the Easter AALS Convention, and return. While in Perth I called on Steve Reeves to see how he is progressing with his WAGR Msa Garratt, but it has come to a standstill due to other commitments.

We arrived home in early June to find a letter from Peter B Wardle of UK. In the March-April 1996 issue, AME published some photos of his 2½" Garratts, and because of this, he has had enquiries for plans of these locos from readers in Australia. He has approached me to be his agent in Australia because the cost of photocopying and postage from the UK worked out at £4.13 each time. At the present exchange rates that is approximately $12.00.

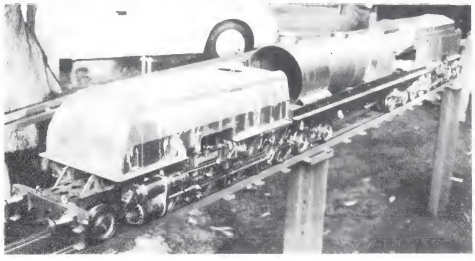
Peter has built two types of Garratt — the East African Railways 57 class 4-8-4 + 4-8-4 and a standard gauge industrial Garratt 0-4-0 + 0-4-0. He says that "the EAR with different tanks makes a nice NSW 60 class," while the industrial Garratt doubled up would make a nuggetty 5" gauge passenger hauler with 4 cylinders of 36mm bore x 58mm stroke (1⅜" x 2¼") and 1450mm (4'9") long over the buffers. Anyone interested?



*A view of the other end of Mel Skinner's AD60 class.* Photo: David Proctor



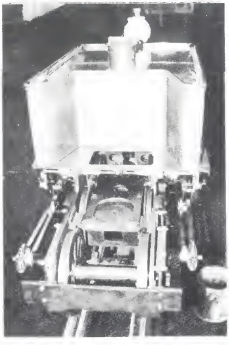
*Two views of Mel Skinner's AD60 class NSW Garratt. Note the fabricated cylinders (above) and the lower photo gives an impression of the overall length.* Photos: David Proctor



Peter writes — "Now, these drawings. I don't do full sets of drawings but what is available gives essential details to make *tanks/chassis/boiler* and *arrangement* for *William Francis*, the 0-4-0 + 0-4-0 industrial Garratt, and for the EAR 57 class, just ***chassis/boiler*** plus *full arrangement side views*."

If anyone is interested in buying copies of these Garratt plans please contact me through the AME office.

As a matter of interest, the prototype *William Francis* was the last standard gauge

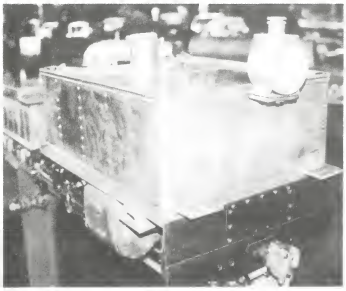


*A rear view of the engine unit for Graeme Tinkler's G42.* Photo: David Proctor

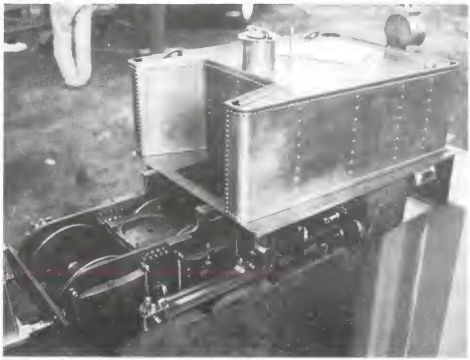
Garratt to run in Britain and is possibly being rebuilt at Bressingham Steam Museum, Norfolk, UK.

On Queens Birthday weekend I attended the Hot Pot weekend at the I.L.S. track, and there on display was Mel Skinner's 60 class which is slowly progressing and already looks impressive. Graeme Tinkler had the front engine of his G42 on display, showing the detailing he has been doing to it.

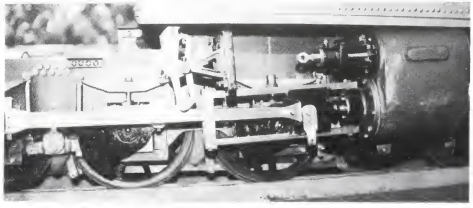
In the *Club Roundup* in the last issue of AME, there is a photo of Keith Bradford's Australian Portland Cement Garratt. Would it be possible for AME to have a couple of photos of it (suitable for a cover picture)?



*Above: a front view of Graeme Tinkler's G42 engine, showing the large headlight.* Photo: David Proctor



*Two more views of Graeme Tinkler's G42, the above one showing to advantage the intricate tank work, and below, the valve gear takes shape.* Photos: David Proctor



## Kenith T Tinkler

### 1917-1998

It is with regret we record the passing of Kenith T Tinkler on Monday 24 August 1998, aged 81 years. Ken was a member of the Steam Locomotive Society of Victoria and held numerous positions, including President, in that Society.

His greatest legacy to the Australian live steam fraternity was his 9 years as Secretary of the Australian Association of Live Steamers. In 1975, when the Association was formed, Ken was elected as secretary and for the next 7 years he was AALS. Its only officer, he was also Treasurer, Insurance Officer, writer of letters to governments and other similar people, plus always pushing the hobby's barrow to whoever cared to listen. He was known from one end of the country to the other plus many places overseas.

He was not backward in putting things forward for consideration and telling things like they were. You knew where you stood and it wasn't being done for Ken Tinkler, but for all those out there who formed part of this great hobby.

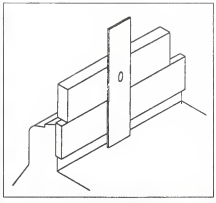
I have been proud to have counted Ken Tinkler amongst my friends. I have sought his counsel and advice on things many times over the years. This and the meetings with him around the "traps' will be sorely missed. A fine gentleman, he will be missed by many.

***Barry Glover***

## Handy Hint

This is my favourite quick tool for assisting setups in the milling vice — much easier than using a square or protractor. The thin blade is ideal for thin and small jobs. Use a couple of bits of gauge plate or accurate bright mild steel

G.M.



*(Reproduced from the Auckland Society of Model Engineers' "ASME News" No. 408)*

# Two-Cylinder Single-Acting High Speed Steam Engines — part 1

**by Don Payne**

At the turn of the century the two cylinder high speed single acting fully enclosed steam engine was very popular in industry for a multitude of uses for auxiliary plant. This engine could be used on mains pressure steam, exhaust steam or processing steam and was available from many manufacturers including Bellis & Morcom, Reavell and Westinghouse in various forms and sizes.

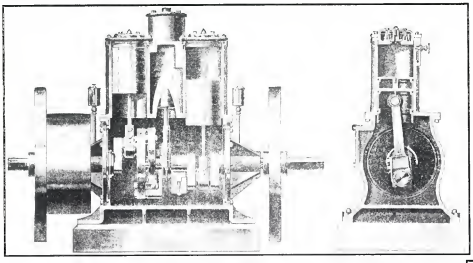


Figure 1

A Westinghouse Standard Engine is shown in longitudinal section in **Figure 1** and it will be noted that this engine has a central valve between the cylinders driven from an eccentric on the main shaft. A transverse longitudinal section through the piston valve is shown in **Figure 2**.

A simpler engine which lends itself very readily to model making is the Westinghouse Junior Engine shown in full view in **Figure 3** and in longitudinal section in **Figure 3A**. A section showing the piston valve on top of the cylinder block is shown in **Figure 4**.

In model form Stuart Turner has produced for many years the very popular *Sun* (¾" x ¾") shown in **Figure 5** and the *Sirius* (1"x 1") shown in **Figure 6** for ordinary or flash

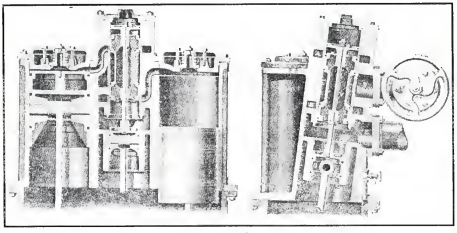


Figure 2

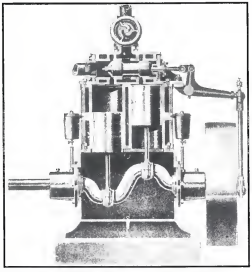


Figure 3A

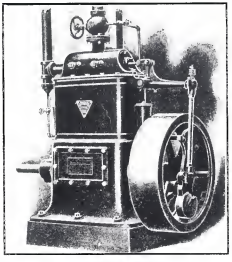


Figure 3

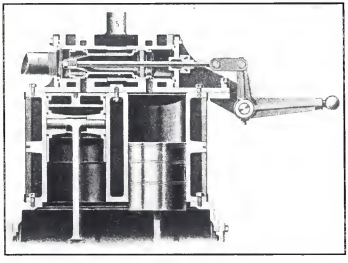


Figure 4

steam boilers. A part section of this engine is shown in Figure 7 and the drive to the piston valve by bevel gears is also shown. A simpler version showing the drive to a slide valve by eccentric and bell crank as in the full size Westinghouse engine is shown in **Figure 8**. This is Edgar Westbury's *Humming Bird* from *Model Engineer* (3rd November 1949).

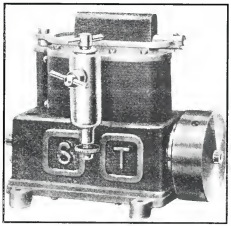



**Figure 5**

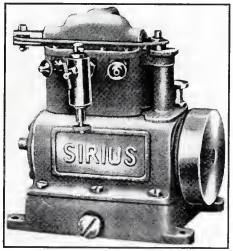



**Figure 6**

During the early 1930's these two-cylinder high speed engines were very popular for flash steam speed boats and some extraordinary speeds were attained. A very compact engine from *Model Craftsman* (July 1933) is shown in **Figure 9** with the slide valve drive by a scotch crank shown in **Figure 10**. Drive to the slide valve from the main crankshaft was by external bevel gears. At ¾" bore and stroke it was stated "using 150 lbs of steam, the engine will turn a racing propeller under water at better than 3800 rpm. Running free, the speed goes up to 5000 to 6000".

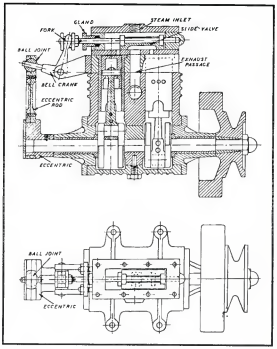



**Figure 8**

Another early *Model Craftsman* design is shown in **Figure 11** (⅜" x ⅜") and this engine had a unique valve of the rocker type, but is stated to not work with wet steam. The valve action depends upon the compression under one end being high enough to overbalance the pressure on the under side of the other end.

An interesting Westbury designed engine is shown in **Figure 12** which is *Gemini* (¾" x ⅝") and in this case the rotary valve on the cylinder top is driven from the crankshaft by spur gearing with the exhaust through ports in the cylinder wall at the bottom of the stroke. Yet another rotary valve engine is shown in **Figure 13** from *English Mechanics* of September 9th 1932, depicting a built up engine of ⅝" bore x ¾" stroke, in which a rotary disc valve is driven by bevel gears from the centre of the main shaft. A diagram of a similar engine is shown in **Figure 14** and a central rotary valve

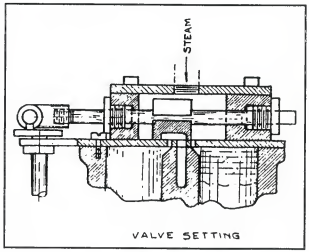



**Figure 10**

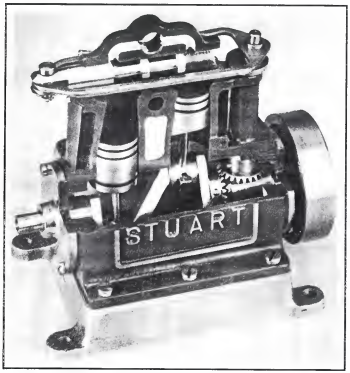



**Figure 7**

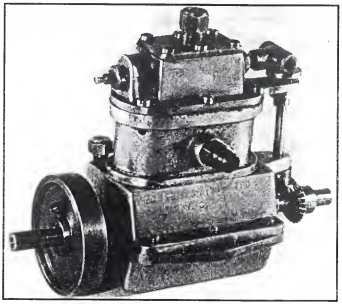


**Figure 9**

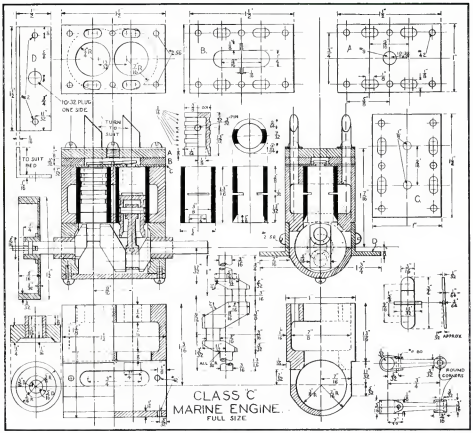



Figure 11

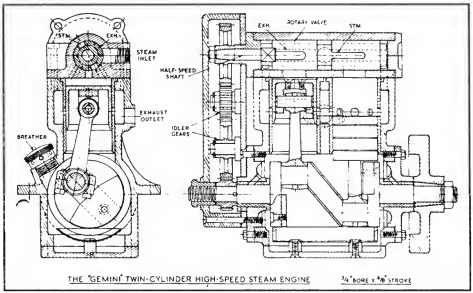



Figure 12

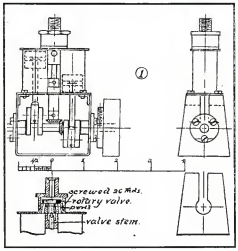



Figure 13

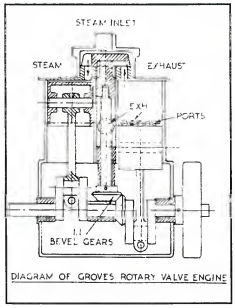



Figure 14

on the cylinder head controls steam and exhaust to each cylinder in turn. The valve is driven from bevel gears through a vertical shaft and a dog coupling which allows the valve to seat itself by steam pressure in the same way as a flat slide valve. Additional exhaust ports are provided in each cylinder, to be uncovered by the pistons at the bottom of their strokes. (For further information see *Model Engineer* 2nd January 1970).

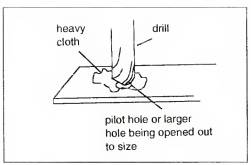
*To be continued ...*

## Handy Hint

When drilling a large hole in sheet metal or opening out a hole, there is often a tendency for the drill to create an 'orrible shaped hole. To avoid this, drill a small pilot hole and then uses a small piece of heavy cloth (a piece of your old blue jeans is pretty good) between the drill and the job. Two layers may be needed. This forms a rubbing pad behind the cutting edge and stops the drill biting into the top corner of the hole you are working on.

G.M.

*(Reproduced from the Auckland Society of Model Engineers' "ASME News" No. 408)*



# D-Day at Hornsby Model Engineers

*Story and photos by Warren Williams*

Saturday 6th June 1998 saw the first all diesel day at the club's Galston Valley Railway. The term "diesel" covered all locomotives, railcars etc. whose prototype was of non-steam power. The day turned out to be excellent, weatherwise, following a week of inclement weather.

Circulars were sent out, and the day received coverage in AME's *Coming Events* Column. As well as many club enquiries, modellers from the Australian Model Railway Association (AMRA) at Rockdale, whose interests are in the O, OO/HO and N gauges rang regarding their attendance on the day.

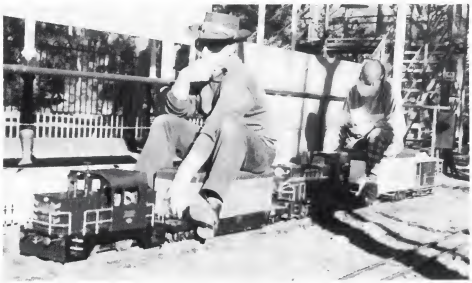
Visitors were welcomed to the GVR by a large sign attached to the footbridge near the level crossing. As well as welcoming them, the sign contained a comprehensive listing of names from the Australian diesel and electric locomotive scene. A selection of photographs were displayed outside the clubhouse, naturally of diesel-electric and electric locomotives.

Clyde and Goninan made a selection of brochures about their locomotives available for distribution to visitors on the day. Many thanks to both organisations for their interest in our Diesel Day.

Forty six members and visitors were recorded in the attendance book. Clubs represented were: AMRA (Rockdale), CSMEE (Canberra), WDLSC (Fairfield), Lake Macquarie LSLS (Edgeworth), Illawarra (Wollongong), SLSV (Victoria) and SSME (Luddenham). There were eleven locomotives of varied prototypes as follows:

*A group discussion on Robert Wooley's two locos just seen in lower foreground, 422 with cover off*

| | |
|---|---|
| NSW XPT Pwr Car (petrol) | A Jones |
| NSW 70 class (electric) | L Phillips |
| NSW X200 class (electric) | L Phillips |
| Qld 0-6-0 cane loco (petrol) | B Day |
| NSW 42 class (electric) | R Wooley |
| NSW 422 class (electric) | R Wooley |
| NSW X200 (petrol) | Beddoes Family |
| B.R. 08 Class (petrol) | E Gray |
| NSW 400 cl. car (petrol) | B Harriss |
| 442 class (petrol) | HME |
| 70 class (petrol) | HME |



*Above: Les Phillips and daughter Rhonda on a short train headed by Les' X200 and 70 class locos. Below: 42 and 422 classes double heading. Driver is Barry Webster (GVR) with owner/builder Robert Wooley (Illawarra) riding behind him.*

Being a holiday weekend, the same weekend as the Illawarra Hot Pot run, could have had an effect on the number of locomotives in attendance, it is hard to say. Hopefully we will do it again and see some more diesel electric/electric locos. There are some fine models around now of non-steam motive power which certainly demand recognition at a gathering such as these special event days.

Robert Wooley from the Illawarra Club created an interest and stimulated discussion when he removed the bodies from his 42 and 422 class locos. They were built along the lines of the AME 422 class but contain modifications of Robert's own design. They certainly looked and ran well in multiple unit, and Barry Webster from the host club was seen enjoying himself at the controls for a few circuits of the Galston Valley Railway. Barry has a NSW 81 Class under construction and showed a lot of interest in Robert's locomotives and modifications therein.

Everyone appeared to have enjoyed themselves, their attendance was appreciated and made the day worthwhile. Thanks to all who helped out, especially the ladies for their involvement on the tea/coffee refreshment side of the day.

# Tracks 'n' Trees

## For the Garden Railway Enthusiast
### story and photos by Brian Carter

It's been a while since this column has appeared. Thanks to all those who wrote in and requested its return. As you can probably tell I've been having a break from AME editorial matters. I'm all fresh for another bash at the keyboards. Happily, I'll leave David to the Managing Editor's position.

I have been busy consolidating my future modelling path and have finally decided to stick to two scales but the same railroad. You can read more about that in the 556 Caboose article in this issue. For the purpose of this column I'll stick to my 16mm scale and other garden gauges as the occasion arises.

I had intended to discuss my construction technique for a 16mm scale boxcar for this issue, however, I don't want to hog the whole magazine so I'll leave it until next time. See the photo below for something to whet your appetite in the meantime.

### The gatherings

There have been a couple of garden railway gatherings this year and as usual they were great fun. The one thing that strikes me most about this group of modellers is that they are mainly relaxed. Their greatest moment of tension comes during the loco running session! It's probably only concentration, I don't think there are too many actual tense moments.

### BNTramway

Michael Bickford's SM32 BNTramway is quite extensive. It has ample opportunity for the radio control drivers to try out their skills. I am still working on my first SM32 Loco so I took the boxcar along for its first run. It was attached to a train of American coal hoppers and seemed content with the world as the train meandered its way around the yard. There were many examples of garden steam locos which were a pleasure to witness in operation.

### Broadmeadow action

I hadn't seen so much steam in Broadmeadow since the 60 class Garratts left the roundhouse! The Rails in the Garden group portable layout was in operation at the recent Our Town Model Exhibition. I had read about recent improvements to the layout and was impressed with the work carried out.

Extra storage sidings for the 45 and 32mm gauges had been provided. Jack MacMicking had built a loco shed and water column. The modifications were carried out by Jock Dewar and John Pierce with some additional help from Dave Moffat and Peter Robinson.

The layout is very large by model railway standards and it certainly stopped the crowds! If you're at Thirlmere for the Annual RTM steam festival on 27 and 28 February 1999 have a look for the layout and see for yourself.

A highlight of the Broadmeadow event for me was a chance to operate Jock Dewar's Fowler locomotive. Radio control modelling is vastly different from the usual ride-on live steaming — it's not as easy as it looks! I disgraced myself by trying to pull up at a stop indication and pushed the throttle the wrong way. By the time I realised, half the train had passed the signal! It was still great fun and I thank Jock for trusting me with his pride and joy.

One thing I noticed was the appreciative audience. The trains may not carry the public in a physical sense, however the sight of the steam sure carries them in an emotional sense.

*Michael Ragg (left) adjusts the load on one of the wagons on a live steam triple header. A scene on the Rails in the Garden portable layout at Broadmeadow.*


*A sneak peak at a scratchbuilt 32mm gauge SR&RL boxcar from Carter Engine Works. Photographed on Michael Bickford's layout. The figure is a Bachman G scale brakeman.*

### Material

Now for the commercial — I would welcome notes or jottings on garden railway topics for this column, even a few photos with descriptive captions. Otherwise you'll just have to put up with my ramblings... how's that for incentive!

Until next time, enjoy your time outdoors.

# Steam Chest

## with Dave Harper

Hi there, steam fans, and welcome to more vapourings from the steam chest. The response to the July/August column has been quite amazing, so if I was a little long responding to anyone who wrote, please be patient, I'll get around to replying soon!

Most correspondence was about the Goldfields Water Supply and the question of the Babcock and Wilcox WIF boiler. Now we know that WIF stands for wrought iron front! This was the header assembly used on the water tubes in many B & W water tube boilers. Several readers sent me copies of drawings from various textbooks, but Dave Merrifield went one better and sent me some photos of the actual boilers and engines at Mundaring where one of the pumping stations has been preserved as a museum.

**Photo 1** is one of Dave's photos showing the front of the boiler with the casing open — the wrought iron header assembly is clearly visible. **Photo 2** is a view of one of the pumping engines showing the wrist plates and push rods for the Corliss valves (nicely painted red). Clearly the engine is a tandem compound with the HP cylinder nearest the pump end. Bigger than your average feed pump!

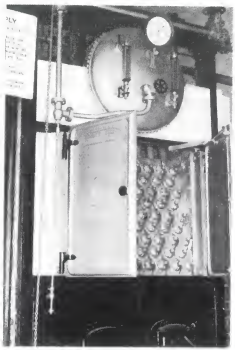


**Photo 1**

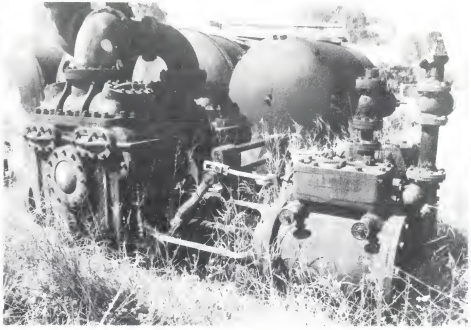


**Photo 3**

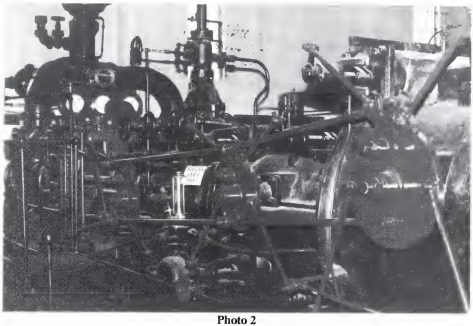


**Photo 2**

Remembering that I'd seen a similar large duplex pump in Graham Chapman's collection not far from my home, I called in there recently and took a couple of pictures to compare. The pump was made by Canton Hughes in the US, has slide valves and a bore and stroke of approx 15" x 24". It was used as a condenser circulating pump in one of the local abbatoirs. **Photo 3** shows the whole assembly in it's overgrown state. I couldn't resist **photo 4** framing the pump in one of the many flywheels littering Graham's paddock. He assures me that he's working on starting restoration work.

Getting back to the WA pumps, it seems that the water pipeline from near Perth to Kalgoorlie was one of the greatest engineering feats in Australian history, pumping water 351 miles through 30" dia pipes rising over 1000ft en route. It was built between 1898 and 1903 at a cost of $2.5m, an astronomical sum in those days. We have a couple of people offering to write an article on the pipeline for us, so

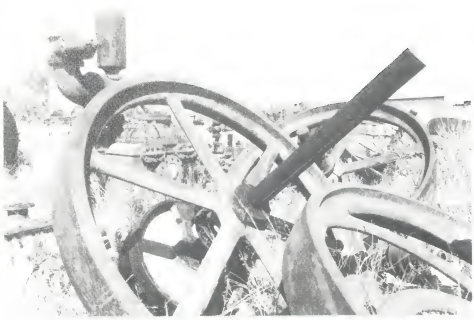


Photo 4

I'm only giving the bare outlines to whet your appetite!

Thank you to all the readers who sent information on this subject, it was much appreciated! I think it worth waiting for a full article on the subject, which seemingly is much better known in WA than over here on the east coast — understandable really, but I'm sure we're all looking forward to reading more of the story from those living on the spot!

## More on Maurie Turner

John Lyas has kindly sent some more information on the superb stationary engines built by Maurie Turner featured in last issue. Some dimensions that can be tallied to the photos in the Sept/Oct issue: flywheel diameters of the engines are as follows; twin horizontal with double flywheels 7½" dia, grasshopper engine 8⅜" dia, twin beam engine 8⅝" dia and the twin horizontal with Walschaerts valve gear 6⅝" dia. all of cast iron.

On the subject of the Walschaerts engine, I'll have to eat my words as I found a reference in one of my old books to hauling and winding engines being fitted with Walschaerts gear for economy and fine control. When you think about it, the requirements are much the same as for a locomotive. I wonder if Maurie knew that?

Hopefully I'll have more pictures of his engines in due course.

John also gave me details of how he took the photos, as I assured him that his style was one that many of our readers would like to emulate (flattery gets you almost anywhere!)

John uses a Pentax K1000 camera, (same as mine..) with Ilford FP4 film rated at 125 ASA. The manual SLR camera can't be beaten when you're taking photos beyond the run of normal snapshots. For the shots of Maurie's engines, John set them up on a stand covered with a plain blanket in diffused light coming through a frosted glass window. This gives an uncluttered background with no strong shadows, ideal for the job.

For anyone wanting more advice on model photography, we published an article on it in AME No.66, May/June 1996.

## Comment on Kitson-Still loco

I've been taken to task by R J Morey from Qld about my comments on the Kitson-Still loco that was developed c1924 by Kitson's of Leeds. (In *Steam Chest* May/June 98). I claimed that the design was not a success due to its great complexity.

Mr Morey says that the combined diesel/steam system was used in large marine engines from the first World War up to the thirties with much success. Engines were built up to 8,000hp, but were superseded when diesel engine design was improved. Another factor was the need for boilers and water tanks which all took up valuable space.

Fair enough comment, but from what I read, they were not liked by the engineers responsible for the running and maintenance of them! Also, I believe that the cost of develop-

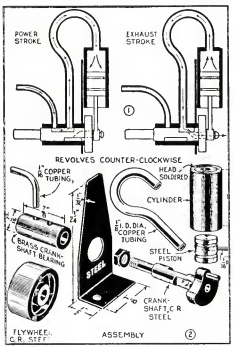



Figure 1

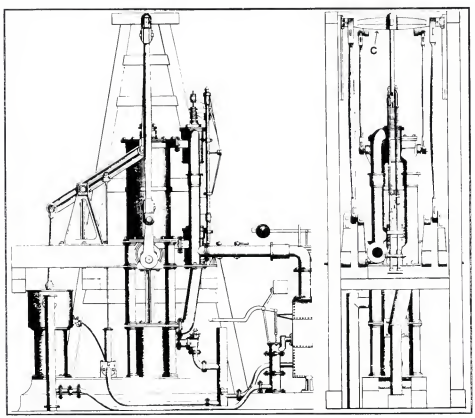


Figure 2

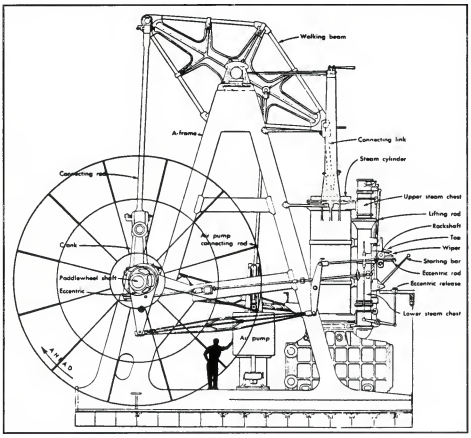



**Figure 3**

ing the loco was a contributing factor in the final demise of Kitson's.

Mr Morey also enclosed a copy of an article giving the history of the loco plus a couple of photos. I'd be happy to pass on a copy if anyone is interested. Thanks for your interest, R J (you didn't sign your letter!)

## A neat little high speed engine

Another response to my request for model engine pictures came from Rev. Canon Ron Dyson of Qld. He sent a picture of his model and a copy of the article from a very old book from which he built it. It is a single cylinder engine 'simple to build and is suitable for driving model steamboats' (**Figure 1**).

The steam inlet and exhaust are controlled by ports machined into the crankshaft, very much like the system used on two-stroke model aircraft engines. As Ron says, this is an unusual engine, and none of his old engineering friends had heard of it, so he thought our readers would be interested.

**Photo 5** (page 47) shows Ron's model complete with the solid fuel fired boiler detailed in the article. He says it runs well on compressed air, but hasn't tried it on steam yet. The diagram also reproduced here shows the principle of operation quite clearly. Again, if anyone would like a copy of the whole article I'd be happy to send one on. Thank you, Rev. Ron!

## Walking beam engines

Last issue I promised to review the book on American paddle steamers and their walking beam engines. Here it is, thanks to Dave Sampson for loaning me his copy!

The book is titled *Paddle Wheel Steamers and their Giant Engines* by Bob Whittier and published by Seamaster Inc., in 1987. It's an A4 size paperback of about 50 pages and it covers the history and development of these amazing craft very well.

Chapters cover the early steam engines and Fulton's experiments, the various types of engines tried, boilers, operation of the engines and the decline of these mighty vessels as late as the 1950s. The river boat *Ticonderoga* and the ferry *Eureka* are the sole survivors of the type and they are static museum exhibits now.

There are numerous diagrams and black and white photos illustrating the book, and a couple of the diagrams should whet the appetite of anyone looking for a challenging model project! One is of the early crosshead type of engine (**Figure 2**) that went out of favour as the cylinder was mounted above the paddle shaft causing the CG to be dangerously high as larger engines were built. The other shows a typical 'medium sized' version with a man drawn in to give some scale (**Figure 3**).

The largest one built had a cylinder bore of 110" and a stroke of 14ft! It developed 7,500 hp and required eight boilers to provide enough steam! The paddlewheels were 35ft dia and each weighed 100 tons! That compares well with the largest pumping engines built, and what's more they operated for a lot longer.

Altogether a fascinating book which may well be still available from the advertisers in AME, or look out for a copy in your local library.

***Check Your Library for This Book!***

Browsing around the Brisbane Central City Library a while ago I came across a new book which will be of great interest to all our ex-marine engineers out there, as well as most steam buffs.

*Steam at Sea* by Denis Griffiths was published by Conway Maritime Press in 1997. Sub-titled *Two Centuries of Steam at Sea* it really is a fabulous book, as is to be expected from this highly reputable publisher.

Chapters cover early developments, paddles, screw propulsion, boilers, auxiliary plant, naval engineering and turbines. There is a detailed index too.

*Continued on page 47 ...*

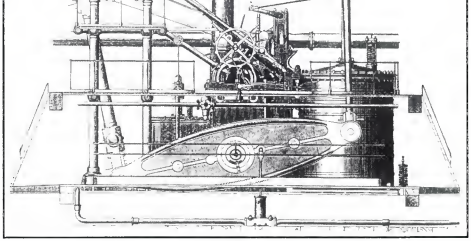


**Figure 4**

# Wa 165

**by Alvin Hall**

and funnel, plus many other items necessary to complete the job. The cab had new sides and back plates, and a roof adapted from a disused Dsa shunter (diesel hydraulic). The front plate was original, in reasonable condition, and because of a special pressed section in the middle, was used again.

We, the Gisborne City Vintage Railway Inc., are very pleased with the result and are now engaged in restoring and repairing carriages for future use.

*(Full details of the NZR Wa class, and in particular Wa 165, formed the basis of an article which appeared in the Jan-Feb 1998 issue of AME. ... Ed.)*

*Both photos show Wa 165 in steam again, looking as good as she did when new back in the 1890's. Compare these photos to those in AME issue 76, showing her near the end of her career with the New Zealand Railways.*
Photos: Treble Court Photos, Gisborne

I was most interested in the articles regarding locomotive Wa 165 in AME issue 76. I have been involved in the restoration of Wa 165 from the beginning and enclose these photographs, taken in January this year, which show it in its present condition.

After 12 years restoration, with all the attendant hassles and delays, it was truly thrilling to see our labour of love almost completed. The first and second firings gave us the opportunity to find any boiler leaks — there were four or five persistent ones and subsequent re-tapping of the washout plugs cured these. At this time we blew out valve chests, minus covers, with steam to clean out any rust and dirt which may have collected in the inlet pipes during restoration. The valve covers were then finished, and at the next firing we were able to see it move under its own steam. A problem emerged with dirt and grit being blown up into the drain cocks, causing them to leak. Pipes have now been fitted to lead the discharge away.

As well as the new boiler, Wa 165 now has new single slide bars, new tyres on the driving and coupled wheels, new con rods, eccentric rods (plus bearing brasses), bearings on coupled rods, new side tanks, bunker, air tanks, smoke box

# Club Roundup

## compiled by Neil Graham

### Ellangowan NSW

The Richmond River Mini-Railway and Model Engineers is a newly formed club situated on the north coast approximately 20k south-west of Lismore. It is a private club with AALS affiliation and insurance. The club was formed by active modellers, currently involved with steam and diesel locos, traction engines, jet and otherwise powered planes and steam boats.

The club's inaugural meeting was held on 6 April 1998. A 300m track has since been laid. It is of the slotted sleeper type of construction with a mix of standard and flexible points. There is a passing loop for five locos and a rainwater tank to replenish the locos. We have a hydraulic scissor lift to load and unload to the steaming bays. A station has now been added adjacent to the passing loop.

Members of affiliated clubs are invited to visit. Our running days are the 2nd Saturday from 10 am and the 5th Saturday which is also a night run. Other times by arrangement. Intending visitors are reminded to bring a letter of introduction from your club, current boiler certificate and check the Code of Practice on brakes and couplings.

***Richmond River Mini-Railway & Model Engineers***
*Address: P.O. Box 269 Casino NSW 2470. Ph/fax: (02) 6663 3302*
***Public Running:*** *None*

### Cape Town RSA

The real work has commemced on the new clubhouse and workshop building. The concrete floors are down and the screed has been laid. The front and rear brick walls between the two garages have been built, and the windows have been incorporated. Water has been laid on. Since the club left the old Goodwood showgrounds some time ago, the Agricultural Society's Committee has agreed to make a very generous one-off donation to the club.

***Western Province Live Steamers***
***Location:*** *5th Avenue Sports Complex, Bertie Ganade St, Church Hill, Parow*
***Contact:*** *Hon. Secretary, PO Box 15810, Panorama 7506*

### Moorabbin VIC

The new bulk char bunker has been commissioned and filled. It holds two tonnes.

The char crusher/screen has been fitted with large wheels to make it easier to move over to the bunker when needed. The track cleaning machine has been overhauled including the fitting of new wire brushes and new detergent tank.

The infra-red train detection system which has been on trial for some months did not prove as infallible as first expected. We are now experimenting with a new device based on a small metal detector circuit.

Club run in June had eight locos and 27 people to run the show and July had 13 and 35 respectively. A special run in May saw seven locos providing the motive power.

Public running days in June had 12 locos available and a very miserable July running day saw seven locos on the roster.

***Steam Locomotive Society of Victoria***
***Location:*** *Rowans Road, Moorabbin*
***Public Running:*** *1st Sunday except January*

### Christchurch NZ

It is great to see many new boats at the facility and also the half dozen 660mm *Image* yachts being built by club members. The pond is in need of maintenance so will be emptied sometime in the next two months and will remain that way for about four weeks.

Members have seen the new track code and with a few modifications this was ratified at the June meeting. The CSMEE is now a member of the Model Engineering Association of New Zealand.

Members of the CSMEE have put in a huge effort and have machined thousands of rail chairs for the Blenheim club track! The Sunday runs are going very well, but we so suffer a shortage of track marshalls and locomotives.

***Canterbury Society of Model Engrs***
***Location:*** *26 Andrew St, (PO Box 33 294) Christchurch*
***Public Running:*** *1st and 3rd Sunday*

### Moss Vale NSW

Atrocious weather at the tracksite has all but stopped work on the track roadbed preparation over the last two months. The expected small subsidence of the embankments has occurred and corrections to the alignment has been completed. Most of the preparation work on the 5" gauge track panels has been completed and it is ready to be laid. We are keen to increase our membership numbers and enquiries are most welcome.

***Southern Highlands Model Engrs Inc.***
***Location:*** *Pie Shop Corner, Illawarra Hwy, Robertson*
***Contact:*** *(02) 4868 2404*
***Public Running:*** *to be advised*

### Eltham VIC

The committee has decided that the railway will operate during the Eltham Festival on the 14th and 15th of November.

The Lions Club of Eltham has been accepted as a corporate member following a request that the club would like to become involved in the activities of the railway.

Saturday 9th May was a huge day for the Way and Works branch when some ten x 20 foot panels replacing the old track at Fork Tree Cutting. Sunday 2nd saw the Pine Tree Loop booked out of service to allow the removal of the old track. Starting early on the 9th, all the old ballast was removed, roadbed prepared and the new ballast spread, with the VR G running a shuttle service bringing the ballast to the site. Also during the day, it was decided to re-sleeper from the tunnel back to the new section of track. A very full day was had with work completed, just as the sun set, with final alignment checks being made. Many members have commented on the now very smooth ride.

The track was re-opened to full traffic on the morning of Sunday 10th May. Everyone agreed it was a fantastic job done by all.

Interlocking has been constructed to allow drivers in and out of Nillumbik when Diamond Valley B box is switched out. Work is expected to commence soon in front of Diamond Valley B Signalbox with new conduits, pits and cabling in preparation for construction for the new building.

The Diamond Valley Station's new roofing has been completed and new security lighting installed. The majority of the trackwork for the new up line between Meadmore Junction and Diamond Valley is virtually complete.

***Diamond Valley Railway Inc.***
***Location:*** *Lower Eltham Park, Main Road, Eltham*
***Public Running:*** *Every Sunday except Christmas*

### Petone NZ

A very successful day was had at the Hobbies Expo at Lower Hutt with over 2500 people passing through. With a compressed air supply on hand some stationary engines were run and these seemed to fascinate the attending people.

Good Sunday runs have been had at the track and as always the diesel shunter has done the revenue earning, assisted by our team of willing helpers.

***Hutt Valley Model Eng. Society Inc.***
***Location:*** *Marine Parade*
***Public Running:*** *Every Sunday*

## Maidstone NZ

Bad weather has set us back a bit, but in spite of this the re-routing of the elevated track has been commenced, to make way for the 7¼" ground level project. The concrete support pouring has commenced for the re-routed elevated track. One of the members is making good progress with his 5" gauge gas fired version locomotive to the Lucky Seven design. Another member is also making good progress on his 7¼" gauge 2-6-2T *Owain Glyndwr.*

***Maidstone Model Engineering Soc. Inc***
***Location:*** *Maidstone Park, Upper Hutt*
***Public Running:*** *???*

## West Ryde NSW

In the last year, the result of our running days was very good with some 21,700 rides being taken. The 50th Anniversary weekend was a success. Despite the very hot Saturday, over 3000 rides were given. The club membership reamains healthy with over 70 members on the books including four life members.

The council drainage project previously planned for has been re-scheduled for 1999.

The May running day was a near non event. June running day was back to nomal with the WAGR V class on the inner main, The outer main had two trains running, one with the 39 class (a 4-8-2 version of the famous 38s) and the other train with the VR S class pacific doing the head end duties. The elevated was served well with four locos on duty. July running day was abandoned

Some 102 members and friends attended our 50th year Anniversary Dinner. Brian and John Hurst and Alan Mackellar were honoured as 50 year members and presented with a commemorative plaque to commemorate their 50 years with the society. John Hurst has also been honoured by the society and the local council for his 50 years as Treasurer

Work is progressing on the track panels for the deviation of the inner main curve. 14 panels have been constructed for both the curve and the adjacent sidings.

***Sydney Live Steam Locomotive Socy***
***Location:*** *Anthony Road, West Ryde*
***Public Running:*** *3rd Saturday*

## Perth WA

After two years of hard work by our members, a new constitution has been voted in by the membership. The club is now up and running well after the closure earlier in the year.

***Castledare Miniature Rly of WA Inc.***
***Location:*** *rear of 100 Fern Road, Wilson*
***Public Running:*** *1st Sunday*

## Gore NZ

In July the club had an outing to Dunedin and toured through a brewery, Tranztech workshops and Taieri Gorge workshops. The Efficiency Trials were held on 1st August and it was deemed to be a great day.

***Gore Model Engineering Club Inc.***
***Location:*** *Hamilton Park, Gore*
***Public Running:*** *3rd Saturday*

## Wollongong NSW

Since January this year the club has "lost" four public running days, three were washouts and one was a total fire ban.

The new rain water tank has come on line to provide locomotives with "clean" fresh water, which should see the end of injectors salting up on a regular basis! The track gang has been hard at it with the upgrading and replacement of track and sleepers. The gardeners are continuing their never ending task and the painters are nearly complete in the steaming bays.

***Illawarra Live Steamers Co-op Ltd***
***Location:*** *Stuart Park, Westside Squires Way, North Wollongong*
***Public Running:*** *4th Sunday*

## Tauranga NZ

The club has purchased a milling machine which has been installed in the clubhouse. The track has been waterblasted. Steel and wood are on hand for the next project which is the tunnel doors.

The sailors are investigating possible future marine pond areas in Judea Valley and Papamoa.

***Tauranga Model Marine and Engineering Club***
***Location:*** *Memorial Park, Tauranga*
***Public Running:*** *every Sunday*

## Nelson NZ

The new clubhouse building has started! The floor level was established, the switchboard electrical conduit located then part of the concrete floor laid and the first two wall panels have been poured. Since then all other conduits have been placed for the ticket office and the jetty.

Sundays have been getting very busy with plenty of passengers and more Nelson people finding out about where we are.

***Nelson Society of Modellers Inc.***
***Location:*** *adjacent to Tahunanui Beach, Walkare St, Tahunanui*
***Public Running:*** *Every Sunday*

## Warner QLD

The big news is that the year 2000 AALS Convention will be hosted by our society. Preparations have already commenced.

The AMRA model railway exhibition gets bigger every year There was a good show of finished and partly constructed locomotives and Bob Campbell steamed up his traction engine. Our stand was very successful with many compliments forth coming.

Work is nearing completion on a new 6m x 9m shed between the carriage shed and the road. A new point has been installed for the elevated track which will lead to a new turntable and steaming bays. Finally the "smoko" shed has had a spruce up, giving it a new lease of life.

With the number of private locos regularly available for passenger hauling, it has been decided that the club loco will be used mainly for driver training.

***Qld Society of Model & Experimental Engineers Inc.***
***Location:*** *Warner Road, Warner*
***Public running:*** *None*

## Adelaide SA

Biggest happening at AMSRS recently was the Single Line Working Day held in May. Trains were run in both directions with the single line working operating procedures in place. Trains and their drivers quickly settled down into their runs with drivers changing over the staffs at the right time and place. The first two trains ran their roster without incident and this set the pattern for the whole day much to everyone's delight.

## Coming Events

**31 October to 1 November**
**Wagga Wagga Invitation Days**

5" and 7¼" track in scenic surrounds. Model traction engines, stationary models, boats, full-size historic engines, many tourist attractions and a great welcome. Visitors arriving in the week prior to the weekend run more than welcome. Facilities and track will be available for use from Monday 26 October, but security only provided on Friday and Saturday nights. Contact: Cec Appelbee (02) 6925 5182 for more information.

**6 to 8 November**
**Railex 1998 — Evandale, Tas.**

The Evandale Light Railway and Steam Society are again staging their annual Railex, this year for the whole weekend. Track gauges 3½", 5" and 7¼". Steam carousel, model railways, stationary engines, model aircraft, model boats, vintage cars and motorcycles, trade and swap tables. Prizes. Hot food and drinks. Contact is Graeme Reardon (03) 6344 6636.

**23 January 1999**
**Morphett Vale Railway — SA**

M.V.R. members invite you to celebrate with them 21 years of operation of the railway. BBQ and night running, visiting locos welcome. Join in for public running the following day. More info, contact John Wakefield Ph.(08) 8362 3269 Fax (08) 8362 3952

**2-5 April 1999**
**AALS 43rd Convention**

Lake Macquarie Live Steamers, Edgeworth NSW (no further details available)

**6 to 11 January, 2000**
**Model Engineers Convention — Blenheim NZ**

Marlborough Associated Modellers are hosting this 2-yearly event. 2½", 3½" and 5" elevated and 5" and 7¼" ground level. Further details later.

# Malkara Model Railway Exhibition '98

**Story and photos by David Proctor**

*John Nicolson's 7¼" Black Five in steam on rollers (above) and a selection of work from the clockmakers group in the Canberra Society of Model and Experimental Engineers (below)*

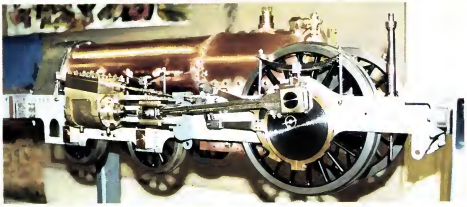
*(Below) The ACT Model Boat Club display included this ocean going trawler* Polar

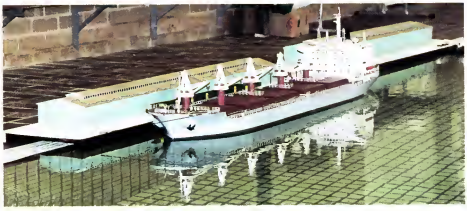

Every year on the first weekend in August, the Malkara Special School in Canberra stage their annual Model Railway Show. This fixture has grown over the years to become both an important source of income for the school, and a popular event for railways modellers and collectors of all types. This report will be brief so the photos can tell the story.

The Canberra Society of Model and Experimental Engineers were well represented with a large display of members work, including live steam locos, traction engine, boats, clocks, working stationary engines plus various bit of equipment. The club also had their portable track in operation, with the bulk of the passenger hauling being done by two 3½" gauge engines, Cliff Kirby's Vale of Rheidol *Owain Glyndwr* and my Fowler *Airdmillan*. This effort has, as can be imagined, caused a bit of ribbing in a club which is oriented mainly towards 7¼" gauge! The CSMEE display also included John Nicolson's Black Five in steam on rollers, and the articulated wagons previously featured in AME, as well as some artic. wagons to a slightly different style by Bill Devoy. John Oliver found the various pathways which wound uphill and down around the school grounds were an enjoyable place to steam his traction engine.

*John Oliver gets a whiff of the good stuff as he drives his traction engine on one of the many paths at the Malkara school (below).*

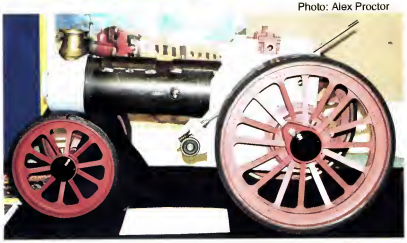
The boat club had an impressive display in and around the swimming pool, retailers were present and several individuals from near and far had their model railway layouts operating. There were displays of radio controlled cars, plastic kit models and other crafts. If you missed Malkara this time, there is always next year!





*Photos clockwise from above: Bill Devoy's articulated cars, based on double stack container wagons, near completion. Airdmillan driven by Kevin Olds and Owain Glyndwr driven by Brian Dunn, carried the live passengers, and Bob Ball's Crampton shows a very high standard of workmanship. The boating fraternity made good use of the pool as shown by the bulk carrier Nerang alongside, Jim Mitchell's Burrell nears completion and finally we have a narrow gauge caboose.*

Photo: Alex Proctor



# S. R. & R. L. Caboose 556

**by Brian Carter**

*Photos by the author unless otherwise indicated*

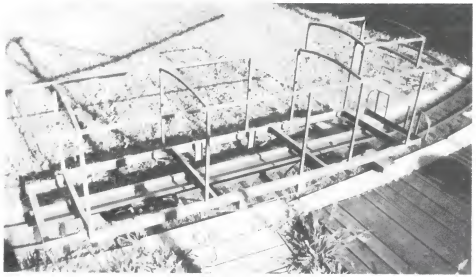
For more than fifty years, Franklin County, Maine, enjoyed the best two-foot gauge railroad in the USA. The Sandy River Railroad was started in 1879. In 1908, the Sandy River merged with all of the other Franklin County "Lilliputs" and emerged as the Sandy River and Rangeley Lakes Railroad, boasting over 120 miles of track and thirteen locomotives. It flourished until the 1920s when cars and trucks made inroads into its once prosperous business. Its untimely demise came in June, 1935.

The Franklin County Railroads comprised of the Bridgton & Saco River RR (1883-1941), The Kennebec Central RR (1890-1929), The Monson RR (1883-1943), The Sandy River & Rangeley Lakes RR (1879-1935) and the Wiscasset, Waterville & Farmington Rwy (1893-1933).

## The seed is sown

My fascination for the Maine two-footers began in the mid seventies when I became the proud owner of a book entitled *The Maine Scenic Route* by H Temple Crittenden. The author captures the spirit of the fight that went into the formation and survival of a narrow gauge railroad that proved beyond doubt that it wasn't a toy. It describes scenes like the tale of Fred Leavett and loco No. 20 — how they left the track without knowing it and bucked snow for a half an hour out in a field before they discovered (when they got out to shovel) that they no longer had rail under them! It was a tough little railroad where the employees and equipment often worked under very difficult conditions.

The book has a dedication that simply reads: "To the memory of the men who kept the wheels rolling on the Sandy River Line". I was filled with admiration for the railroad as well as for those who kept it going. I decided to continue the sentiment of the dedication and consolidate my railroad modelling efforts around the Maine Narrow Gauge equipment.



*The basic frame shell begins to take on its final form. The front platform handrails are yet to be fitted.*

By the time all this came around I was already well into construction of my 5" gauge 0-4-0 two-foot gauge Decauville locomotive. I didn't want to abandon it so I plodded on until it was finally finished in 1989. About 1986 I had itchy fingers to get started on some Maine equipment — a locomotive was out of the question for now — maybe a piece of rolling stock?

Model Engineers are not generally known for settling on one project at a time, and I am no exception. *The Maine Scenic Route* has an appendix with lots of equipment plans drawn by the author, so many to choose from! The 0-4-0 would take care of the front of the train... how about the back of the train! So my version of S.R.&R.L. Caboose 556 was born — I could fill in the rest of the train later.

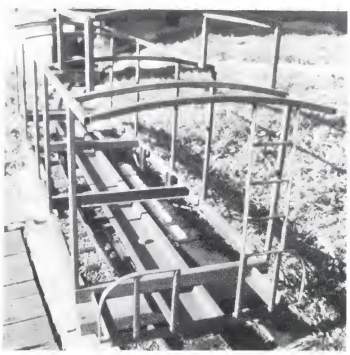
## Warning

This is a mixed dimension article, both Imperial and Metric measuremenis are freely tossed about as they occurred during the construction period. No measuring rules were harmed during the writing of this story.

## Early days

S.R.&R.L. had several caboose designs, but 556, with its partners 557 and 558, seems to be the style that typifies the American caboose of the early steam era, regardless of gauge — end platforms, a cupoia at the rear of the roof section, the pot-belly stove and timber construction.

The drawing of 556 in the book is very small, four views in 150mm by 65mm! Thank goodness for enlarging photocopiers — I was able to produce a workable size drawing on an A3 sheet. The drawing contained the major dimensions but the bulk of the detail was pure guess-work on my part. Working from photocopies is a dangerous practice because they enlarge as a percentage, which produces slightly different scales for the length and height. I checked on several more dimensions and noted the scaled sizes on the drawings... this sort of works if you note everything. For some projects, like the new caboose trucks currently under construction, I devised a system that has proven quite useful. I print two full-size working copies... one scaled for length and the other scaled for height off a known horizontal and vertical dimension on



*A look from the rear showing the centre sill arrangement, the end platform handrails and ladder.*

*My youngest son Russell showing off the riding position. He was in Primary School when this was taken, he is now 18! Note the particle board floor. The seat now inclines back a little. As you can see, the upper sections of the body have very little mass compared with the lower area*

the drawing. The sheets are marked accordingly and the dimensions taken off the appropriate sheet.

The drawing only shows the outer shell, I had no photos of the caboose and the drawing lines were coarse due to the enlargement. In fact, the only information I had was the caption below the drawing: *Built by the Maine Central in their Waterville Shops in 1913. There are three identical cars, the 556, 557 and 558. Cars were painted the standard red with white lettering.*

## The design phase

One thing was certain, the caboose was going to be big! The prototype is (I have since discovered that it still exists and is undergoing restoration) 28 feet 10½ inches long. Two-foot gauge prototypes running on 5" gauge track converts to an easy 2½ inches per foot scale. Therefore the model would be around six feet long! At least it would fit in the 7ft x 4ft trailer. The width of the prototype is 6 feet 5 inches which works out at 16" for the model. This is where I got to thinking that it might be possible to actually ride in it. However, I didn't want to stand back on the sideline while the kids had all the fun, I wanted to ride in it as well. Would I fit?

Out with the tape measure and a couple of boards, I sat on the workshop floor with a board on either side of my hips and measured the distance... 18". Maybe a little stretching of the caboose width — certainly an easier option than reducing my hip measurement. An extra inch on either side of the cupola shouldn't be too big a hassle. The final product was a semi-scale version of 556 preserving the scale length and height measurements but to widen the car body an extra 2" while maintaining the cupola scale width to help achieve a "narrow" feel of the whole thing.

With a "live" passenger, the safety of the rider in the event of a derailment became a concern. With this in mind, I decided to build a steel frame and cover it with a timber shell. If a derailment occurred, the outer timber shell would probably sustain damage, but the rider would be protected by the steel structure.

## The frame

I purchased some 2" x 1" x 1/16" rolled steel channel for the floor frame perimeter and cross members. There was a convenient strip of pressed metal on hand for the centre sill. The overall mass of the caboose became a point to consider as I looked at ways of constructing the side and roof supports. My solution was to use ½" RHS for these parts as they are strong and light-weight. RHS also allows for an easy method of attaching the timber sides which I will describe later.

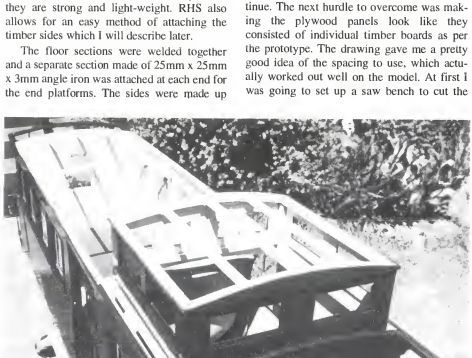
The floor sections were welded together and a separate section made of 25mm x 25mm x 3mm angle iron was attached at each end for the end platforms. The sides were made up with vertical lengths of ½" RHS at each end of the sliding door and another in between the second and third side window location. A length of ½" RHS was used for the top side rail. It became quite a rigid structure.

I had previously built a set of curving rollers to curve the loco roof and the boiler cladding. I tried the rollers out on a piece of the RHS and found that, with care, I could put a curve in it to match the roof profile. I made up a few lengths to use for the roof supports. With the car body complete, I welded the cupola frame together. I allowed for an opening to be fitted with a removable hatch to enable a rider to get in and out. The opening extends from the end of the second side window right up to the front of the cupola.

The basic frame took a few weekends to assemble. I fitted a panel of ½" thick particle board to the floor frame and climbed in to see how it fits. I still had very little idea of how to construct the outer body shell, so I let it go for a while to think about it...

## The body work

I chose 3mm thick marine grade 3-ply as the outer wall material for two reasons, it was important to keep the caboose "bottom heavy", and being an outdoor activity the caboose is likely to get wet sooner or later. So far the frame could be lifted by one person and the addition of the particle board floor meant that the centre of gravity was fairly low. This was a trend that I wanted to continue. The next hurdle to overcome was making the plywood panels look like they consisted of individual timber boards as per the prototype. The drawing gave me a pretty good idea of the spacing to use, which actually worked out well on the model. At first I was going to set up a saw bench to cut the



*The body was painted inside and out before the roof was fitted. This view shows the longitudinal bars added to the fixed roof sections to help the thin roof ply maintain its form.*

*The rear end platform area. You can see the odd shape of the side handrail — just like the real thing*

grooves in the facing ply, but I was concerned about accurate indexing for each cut. The ply was made of hoop pine so the timber was fairly soft. I experimented with hand gouging the grooves on a ply off-cut. The idea had some merit so I pursued it further. After cutting all the side and end panels to size I eventually settled on cutting through the outer ply with a flat 1/16" wide Jenny calliper blade. I was able to index the grooves using a ¾" x ¾" x ⅛" strip of brass angle. I cut all the grooves before I cut out the door and window openings.

Cutting each groove by hand proved very tedious but the end result was well worth the effort. I could only cut a few grooves at a time because the process gave me a bad dose of RSW (Really Sore Wrists). Needless to say the grooving process lasted several months!

## End platforms

It was difficult to gauge from the plan exactly what the end platform handrails and ladders looked like. I still had no pictorial evidence of the caboose. I thought it would be best if I stuck to a robust approach. Fine detail in that location would be quite vulnerable to damage. The upright bars on the handrails are 10mm square bars welded to the platform angle iron. The handrail is 10mm x 3mm flat bar welded to the uprights.

The ladder is fabricated from 10mm x 3mm as side rails and 6mm diameter steel bar as the rungs. The rungs were machined with a shoulder at each end and riveted through the side rails. The ladder rails were welded between the handrail and the underside of the end roof section. It is a very strong assembly and should take a fair bit of knocking around. I've tried to disguise as much of the welding as I could so it didn't look too rough and ready.

While I was working on the platforms I decided to make up the steps to suit. This is another vulnerable area so they had to be strong. The tread on the prototype was a timber plank, on my model it's a ⅛" thick steel strip welded to steel straps. You can't pick it now though because I covered the steel tread with timber veneer and put dummy rivets in the support straps. It looks just like the real thing!

I made up the timber end beams from Pacific Maple, it didn't look as well as I had hoped at the time and has since been replaced with new end beams made from a New Guinea timber called Malas. This timber has a dark colour (almost like walnut) very fine grain and is easy to work. It is a little soft for the application but it should be tough enough. All the natural "exposed" timbers are finished with one coat of Sanding Sealer and two coats of clear satin varnish.

## The sliding doors

This part of the project turned out to be fairly straight forward. I gave the doors a 3-D effect by cutting out the window and lower panels first, then fitted another 3-ply piece behind the lower panels. The door window openings were left unglazed until the caboose body had been fully painted inside and out. This allowed me to use a larger sheet of acrylic to cover each set of windows without having to cut and fit small panes for each opening.

Because it was primarily a riding car and only a very-near-scale replica I built the doors in a closed position only. I fitted the "sliding" doors on each side first, then continued with the outer walls. The end doors were made later but used the same basic technique. The corner mouldings on the doors were knocked up using ½" quad timber.

## The body panels

When the side and end panel grooves were finished I worked out where the windows

*The sliding door and its handrails. The effective 3-D look on the lower panels stands out in this view*

would fit and cut out the openings. I fitted the end walls first to allow the side walls to finish flush with the car ends to avoid an unsightly seam showing on the sides of the car body.

Attaching the timber to the body was an interesting exercise. At first I thought of using a waterproof adhesive, but I have never trusted adhesives as a long term solution to a situation that really needs a mechanical fix.

I had an idea that worked really well. I used "pop" (cherry blind) rivets to attach the 3mm thick 3-ply walls to the RHS shell. To hide the rivet head I drilled a shallow hole to the rivet head diameter after I drilled the 1/8" hole for the rivet shank. The pressure of the rivet squeeze forced the head into the counterbore and below the surface of the ply. The rivet head was later sealed with Wood Stop putty and sanded smooth. It is very difficult to see where the rivets are after the caboose is painted. Using the RHS for the frame meant that the other end of the rivets remain out of sight within the steel cavity.

To ensure a certain amount of rigidity to the 3-ply walls I prepared some Poplar timber strips to the same dimensions as the RHS. I used Poplar because it is relatively strong, very light weight, and usually has a very straight grain. The timber strips were attached to the inside of the walls with contact adhesive. I put an internal wall covering over this later.

sill for each window. These parts were made up from ply strips by my son Russell. The end result looked good even though Russell and I had no idea of what it should have looked like.

It was my intention to spray paint the car body after the basic shell was constructed. I thought if I left the protective paper covering on the acrylic sheet it might be an effective masking medium. I tried painting a scrap piece of acrylic covered with the paper, the mineral based paint didn't seem to have an adverse effect on the plastic.

At this stage the door glazing wasn't attended too, this came after caboose body was painted inside and out.

## Side strip

I'm not sure of the technical term for this part, but along the side of the caboose above the windows is a strip of timber. This forms part of the body framing on the prototype, but on my model it's only a simulation. The strip was made from one piece of 1.6mm thick 3-ply and cut to fit in along each side.

## Painting tip

Just before I was ready to paint the caboose, I had a timely visit from Alan Fern. Alan's marine models are beautifully finished. He suggested that the best way to get a run-free smooth finish is to arrange for the surface to be painted to be horizontal. This way you can lay on a fairly thick coat without the dreaded runs.

Alan's idea worked fine for the sides but was difficult for the end panels. The caboose was too long to handle and I wasn't comfortable with the idea of spray painting off a step ladder. I decided to paint several light coats on the end panels to compensate.

## Painting the body

I'm still not sure whether the procedure I used for painting the caboose was the ideal sequence. I painted the car body first, inside and out, then made the roof covering and painted it afterwards. However, the final result came out okay.

The drawing stated that the car was "Standard red". What was standard red? I phoned or wrote to a few people I thought may have provided the answer... they did, but each was different! Back to the drawing board. From my HO days I remembered that Floquil® paints had a caboose red colour in the range, I went to my local hobby store to find some. It wasn't as easy as I first thought, but after a while I eventually found a shop that had some. You wouldn't want to know... they had a light red and a dark red as caboose red. I picked the darker red as it seemed more appropriate. A Floquil jar of paint wasn't going to go anywhere near far enough to cover the caboose. Next stop was to a Bristol Paint shop. They tried to colour-match the caboose red with their computer but gave up after four attempts. I looked through their colour swatches and found something that looked close. They obliged and mixed up a four litre container of what they called Barrister Brown. The result was good but just a little dark, I asked them to squirt another drop of white pigment in and the colour came out perfectly matching the caboose red.

After the holes and blemishes in the bodywork were repaired and filled, the end rails were masked off and the whole car was sprayed with a pink primer.

After drying for at least a week, the primer coat was sanded back to a fine finish. Once all the sanding dust was removed from the painted surfaces, the interior colour was applied. I found out that the interior colour of 556 was a kind of mustard yellow. Again, what is mustard yellow? I settled for a colour that seemed to match. Unfortunately it's a bit lighter than I would have liked. I discovered later that the yellow that Caterpillar use to paint their earthmoving equipment would have been closer to the mark. Because of the way the door glazing is attached it is difficult to change colour at this stage so I left it as it came out.

The roof and door window openings were masked off ready to paint the exterior. The whole outside was given one coat of the red. It looked very good until I noticed the grooves I had cut into the ply, the root of the grooves had sucked up the paint and looked very poor compared with the top surface. In certain light it looked like there was no paint there at all. This wouldn't do, so I went over each groove with Wood Stop putty to fill the grain and wiped out the excess with a soft cloth. This process left a more rounded surface in the base of the grooves and added a couple more weeks to the construction time! After the putty dried I brushed a little caboose red paint into the groove with a fine-tip brush. The whole lot was sanded smooth with a fine sanding block and re-sprayed. A much better effect in the grooves this time.

## Unmasking

I slipped this part in separately because I left the paint to harden for a couple of weeks before I removed the protective paper from

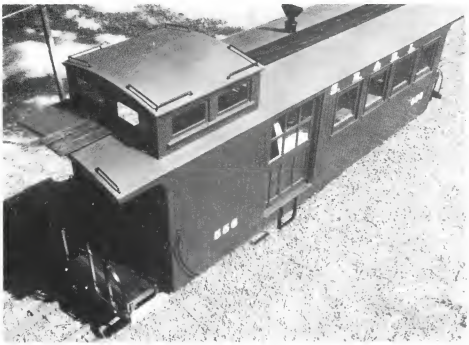
*The re-built truss rod assembly. The queen posts support the rod away from the car body. They were simple cross-halving joints in triangular shaped steel sheet and silver soldered together to a square sheet base. A small tube was soldered to the tip of the triangle to hold the truss rod.*

## Windows

With the end and side walls fitted it was time to bite-the-bullet and make the windows. Without any photos or detail sketches of the caboose it was difficult to decipher the drawing. I continued the trend and made the windows fixed in the closed position. If I had any idea of how the prototype windows operated I would have reconsidered.

The glass was simulated with 1.6mm clear acrylic sheet. The plastic sheet was fitted to the inside of the window panel with a small timber frame rebated along one edge to 1.6mm deep and about 3mm wide.

The drawing indicated some kind of edging around the exterior window frame and a



*The roof is fitted and painted. Note the corner hand rails on the cupola roof and the grab iron on the right rear of the roof near the ladder.*

the acrylic windows. I bought a few new Stanley Knife blades to be sure I got a clean cut around the window frames. By this time the windows were well and truly painted over and I was a bit worried whether the plastic had suffered damage from prolonged exposure.

I had nothing to worry about as the paper peeled off just like it should have and left the acrylic clean and bright.

## Roof

It's amazing how much the expectation of a completed project builds up once the bodywork is painted. Not yet though... there was still plenty to do.

The roof is made from the same marine ply as the sides. I had already cut the panels roughly to size but now comes the tricky part, attaching the roof without damaging the sides.

I made up the removable section first so that I could check for interference in the body work without the rest of the roof in place. Once it was ready it was left in place as a gauge for the fixed roof sections. This method resulted in a good close join that is difficult to pick from just a metre away.

All the roof panels were painted with Pink Primer first and left to dry. Then they were painted with interior yellow on the underside so that I didn't have to crawl inside to paint them after assembly. The fixed roof sections were secured to the RHS frame with Pop rivets using the same method as the side and end panels. The cupola end roof panels were attached first because the area was a bit more complicated, and time consuming. The front roof panel was secured last.

There was an allowance of about 6mm overhang on the outer edges of the roof. The overhang was planed off after assembly to ensure a match to the car body shape — especially after laying the roof to the curved surface.

## Painting the roof

The colour of the roof was another area that received a fair bit of debate. As far as I'm concerned, the jury is still out on this one. However, I have decided to follow the advice from the people that have experience with the prototype equipment.

One fact that is undisputed is that all of the S.R.&R.L. equipment was fitted with metal roofing sheets on the exterior. Much larger, but a similar fashion to shingles — that's why a lot of the rolling stock survived to this day. It appears that the only protection the roof received was a coat of red lead paint. The closest approximation I can find is the Galmet® red oxide metal primer.

Adding sheet metal to the roof would have raised the centre of gravity so I decided not to imitate this feature on the model. I just painted the timber surface of the roof with the red oxide using a 50mm wide sponge roller. The sponge roller gave the surface a great texture as well as a thick coating. The roof has two coats of metal primer over a pink primer base.

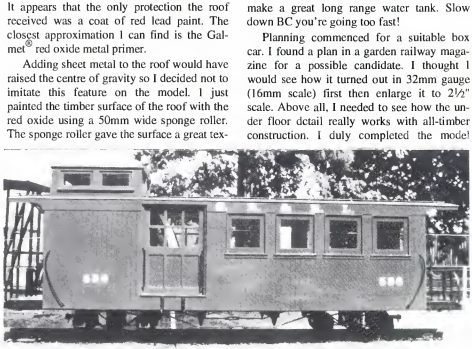
## A slight diversion

As I mentioned earlier, I am used to having a few projects on the go at any one time. The problem with writing a story like this is that the actual event took place over many years (I don't want to know how many!). During the period of construction I became aware (through Camden Miniature Steam Services) of a group of HOn3 modellers in the US who have a keen interest in the Maine Narrow Gauge lines. One of them produces an excellent small magazine called the *Maine Two Foot Quarterly*. I took out a subscription and digested the new information with great interest. Camden Miniature Steam Services also had several Maine Narrow Gauge books and a video called *Ride the Sandy River* in their catalogue. Needless to say I ordered them all!

The video arrived about an hour after I sprayed the undercoat on the caboose body! It is a black and white, silent, production of the last days of the Sandy River and Rangeley Lakes Railroad shot around 1935. No 556 featured in several views. It was the first time I had ever seen the real thing! Needless to say I spotted a few things I would have done differently... but you'll never know.

Early this year I began to think of other items of rolling stock I would like to make to fill the gap between the loco and the caboose. One of the car types that was very prominent on the video was the humble box car. In fact just about every train had at least one of them somewhere in the consist. Other items like flat cars had various fittings that changed their usage depending on the need. Then there were the tank cars, only two 2ft narrow gauge tank cars were ever built... one of those would make a great long range water tank. Slow down BC you're going too fast!

Planning commenced for a suitable box car. I found a plan in a garden railway magazine for a possible candidate. I thought I would see how it turned out in 32mm gauge (16mm scale) first then enlarge it to 2½" scale. Above all, I needed to see how the under floor detail really works with all-timber construction. I duly completed the model



*A builder's photo showing off the lettering and overall proportions of the caboose*

(which may appear in a Tracks 'n' Trees column soon) and discovered a lot of things that need attention on the basement of 556.

## Under-floor detail

See, all that ramble above finally has a point to it! When I put the basic metal frame together for 556, I also built in the truss rods and supports as interpreted from the side view of the drawing only. Boy did I get it wrong! I cut off all the original truss rods and built a new set. This time with real cross beams and queen posts (don't you love the terminology!). Now the truss rods are fitted with working turnbuckles that tension the rods. The visual difference from my earlier attempt was well worth the effort. The steel frame doesn't really need working truss rods, but I feel better knowing they are there.

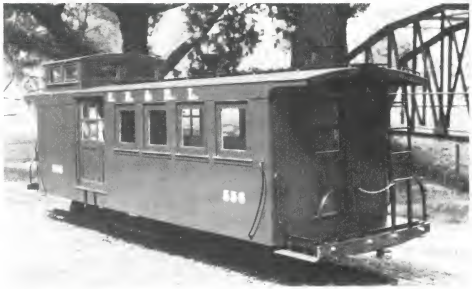
## Truss rod construction

The turnbuckle trusses were easily produced. Cut a length of suitable diameter truss rod (I used 5mm round BMS) a bit longer than half the length of the car body to allow for the bends. Put each rod in the lathe chuck and face off one end and drill a 1/8" or 3mm hole about 8mm (5/16") deep. I used a pair of 5/32" turnbuckles, or get whatever size you require, from a hardware store. It doesn't matter whether they have hooks or eyes or a combination of both because they are cut off anyway. Unscrew the threads from the centre casting and cut off the hook or eye at the end of the thread. Mount the thread in the lathe with the cut end out for machining and turn a shoulder about 1/8" (3mm) diameter and about 1/4" (6mm) long. Make sure that the diameter is a push fit in the rod ends. With the turnbuckle threads and rod ends machined you can either silver solder the thread into the rod or use a high strength Loctite to glue the parts together. The result should look like the thread was produced on the end of the rod and not an attachment. This method avoids the hassle of finding left-hand thread taps and dies.

The rods are bent to the required shape and fitted through the holes in the end of the car body. Assemble the turnbuckles, ensuring you don't get the left and right-hand threads mixed up. On the outer ends, make a mark about 10mm further out from the end beams. Remove the truss assembly and cut a suitable thread about 20mm long on the end of the rod so that the thread finishes within the end beam. Reassemble the components with the turnbuckle at about half-way along each of its threads and put a nut and washer on the end of each rod protruding from the end beams and nip them up. Tighten the turnbuckle until there is a small amount of tension in the rods. Neatly cut off any excess thread beyond the nuts at the end beams.

## Trucks

Before I tackled the caboose I made a quickie log transporter car that has three 150mm diameter logs as its load. The car was of no fixed persuasion — just something for the loco to haul around other than passengers. The trucks for the log car were made to resemble a typical late 1800s diamond style common bolster freight truck. The bolster is fully sprung and the side bars are strips of 20mm x 5mm mild steel and uses fabricated journal boxes. Although not strictly S.R.&R.L. I used their basic dimensions for wheelbase etc.



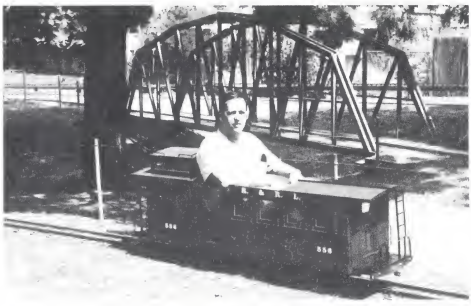
*Another view of the completed caboose. It looks quite at home on the West Ryde track.*

S.R.& R.L. cabooses use Jackson and Sharp passenger trucks with fully equalised suspension with coil springs on the equalising bars and a pair of full-elliptical leaf springs on each side of the bolster beams. My caboose drawing showed the basic truck design but was far too coarse and lacking in detail to make a pair from. I thought I would use the log car trucks in the meantime until I could do something about the passenger trucks.

One of the books I purchased deals with S.R.& R.L. passenger cars. The back page contains a detailed orthogonal drawing of the Jackson and Sharp truck that looks very similar to the type used under 556. I was delighted at the discovery and started making a pair to replace the freight trucks. These are a complicated unit with many timber components as well as metal. Unfortunately they are not yet complete as they are a fairly major project in themselves. I've been photographing some of the special tools I've had to make to form some of the components, so I may share that story with you one day. The caboose body has come out a lot better than I expected so it would be a pity not to push on and provide the trucks that go with it.

## Accessories

The caboose wouldn't be complete without all the hardware hanging off the sides. I made simple jigs to fabricate all the handrails to the same distance off the body. I also made drilling jigs for the hand rail mountings. The rail sizes were basically guesses off the drawing



*A photo of the builder. I couldn't resist throwing an this mug shot to give you a better comprehension of the size of the project. It's not quite what we're used to on 5" gauge.* Photo: Paul Taffa

and scaled down from what I thought they might have been. Their location was plotted off the drawing so that it looked right.

The chimney was a simple metal fabrication that was made hollow in case I could arrange for smoke to issue forth from a miniature pot-belly stove at a later date.

The steps under the sliding doors were fairly simple to make, but I had to be careful to twist the uprights in the right direction to match the prototype.

## Roof walk

The roof walk is a prominent feature of American rolling stock. The longitudinal strips were made from hoop pine 3-ply 3mm thick and stained to resemble a darker timber that may have been used for the job. The hardest part was making all the cross pieces from MDF with a radius that matched the roof and a constant thickness to maintain a level walkway.

## The rider

The comfort of the rider was always in my mind. I had obtained a broken plastic stackable type chair that was suitable. The metal legs were broken but the plastic seat was in good condition. I experimented with different angles for the seat position on the floor of the caboose. When I achieved the position that was comfortable I made a timber base to attach the seat. The idea was to hinge the front edge of the seat base so that I had access to the cupola area for storage.

The result was a very comfy riding position for most people. Unfortunately, not everyone can fit in it. Getting in and out isn't too bad for most, but a couple of people had to be prised out. Maybe I need a size gauge like they use at amusement parks. It's great fun for play days and interclub runs but I wouldn't recommend using it as a guard's van for public days where you have to get in and out a lot!

## The lettering

Signwriting often makes or breaks a model. In this instance I opted for computer-cut vinyl lettering. I was unable to determine the actual font used on the prototype equipment so I made up the S.R.&R.L. and the 556 using a Clarendon font commonly used on most US rolling stock. The height and spacing required for the caboose was adjusted on the computer. I then took the file to the sign shop who cut out the letters for me on matt white vinyl. The self-adhesive quality makes the lettering easy to apply and the final appearance really sets it off.

## Interior detail

One area that needs attention is the inside detail. As usual with this project, it was after the event that I discovered a great isometric sketch of the caboose interior. I may eventually add parts of it as modules. The area under the cupola could be built as a permanent installation and used as a lighting battery storage box.

The riding seat is easily removed and could be replaced with scale furniture and pot-belly stove on public running days.

## Things to come

When I have a few more items of rolling stock complete I'll look at a prototypal coupler arrangement. I found a US supplier of 2½" scale cast aluminium couplers and other items. The current US exchange rate makes them a bit expensive just now.

I have made the hand brake wheels for the end platforms but they are not yet fitted. The new trucks will have operating vacuum brakes the same as my passenger wagons. I'll fit the brake wheels and link them to the truck brake mechanism so that it actually works.

## Conclusion

The caboose was a very satisfying project to tackle. The wood work component was a change from the usual metal workshop activity. In hindsight I would have given second thoughts about widening the caboose body purely for appearance sake.

So far, the caboose has not derailed, with or without a rider. Some guest riders have been apprehensive at first but usually come out smiling! Everyone who has had a go has been delighted with their experience in what may well be the first ride-in 5" gauge rolling stock.

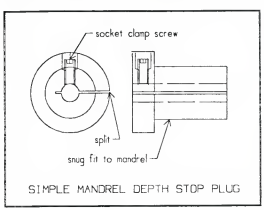
All future items of rolling stock for my S.R.&R.L. empire will be constructed exactly as per their prototype, wooden frames and all. I have had some very good research results regarding the box car — next time it shouldn't be so difficult.

# Two Lathe Depth Stops

**by Dave Smith**

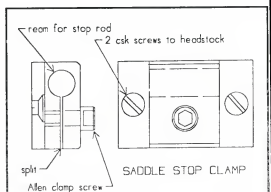
More of those "how did I do without it?" items for the lathe are a mandrel depth stop and a saddle stop. Quite often in our model engineering, we require multiple items all to the same dead length with stepped shoulders, etc. Axles are a prime example. Repetitive operations are a lot easier with lathe stops.

First, the simple depth stop which Stephen Gaal showed me. A steel, shouldered plug about 1½" long, is turned a snug fit for the bore of the left hand end of the mandrel. It is then drilled/reamed for the stop rod and radially drilled and tapped for a clamp screw. At 90 degrees rotation to the tapped hole, the plug is then split for its entire length. The action is simple — as the clamp-screw tightens down on to the rod, it also expands the plug into the lathe mandrel. Don't use a long clamp-screw which could catch up anything (clothing!) while rotating, use a socket grubscrew well below the plug periphery. If you are working on hollow stock or your stop rod sags off-centre, then fit the rod with a head which is a good clearance fit in the mandrel.



SIMPLE MANDREL DEPTH STOP PLUG

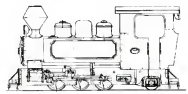
My saddle stop is an aluminium split block attached to the headstock casting with two countersunk screws and with an Allen screw to clamp the stop bar. I use it frequently for boring holes to set depth, turn shoulders to set length, etc. For example, to turn a step exactly 3/16" long, face the stock and without moving the saddle, nip up the saddle lock. Bring up the stop rod to the saddle with a 3/16" drill shank interposed, clamp the stop rod. Remove the drill, undo the saddle lock and turn the shoulder till the saddle contacts the stop rod again.




Dead lengths are dead easy, aren't they?

*(Reproduced courtesy of SLSV newsletter "Big Wheel News".)*

# Bunyip



## A Bundaberg Fowler 0-6-2T in 7/4" gauge — part 3

**by Ian Smith**

*Photos by David Proctor. Drawings by the author unless otherwise indicated*

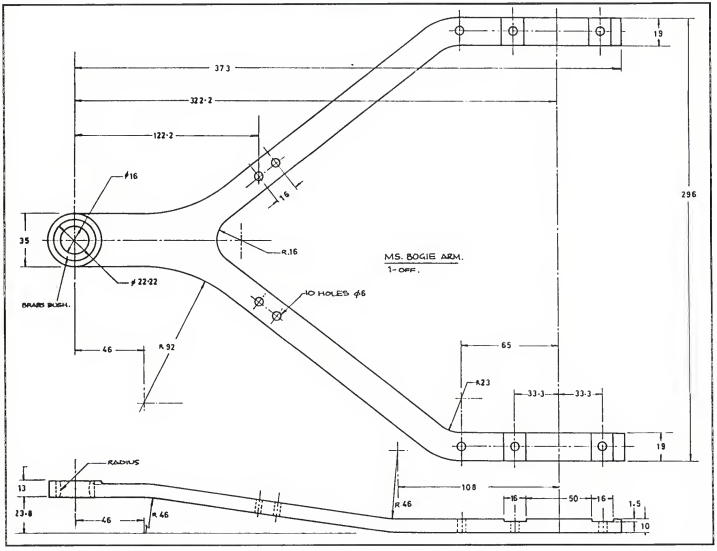
### Bogie

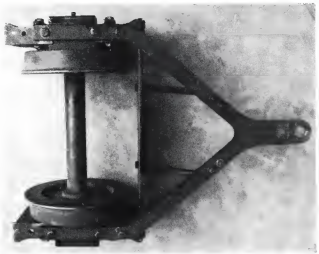
The trailing two wheel bogie is a parallel motion type. It looks complicated but is easy to make. It consists of bogie arm, side frames, cross plates, spring yokes, springs, swing links, wheel assembly and swivelling bolster.

The **bogie arm** is profile cut from 10mm MS plate, in the shape of a 'Y', it has an offset 23.8mm bend in it. Check that the profile is to the correct size and shape as it has a habit of moving when being cut. To put the 23.8mm offset in the arm, mark a line across the ends of the 'Y', 160mm in from the end, and an other 40mm along the stem. That is where the bends will be, easy if you have a press to do it. Another way is to clamp a solid piece of angle in the vice, line up the 160mm mark to the edge of the angle, clamp another piece on top to the line, heat up the ends and bend until it measures 23.8mm at the other mark. Reverse and bend the other end.

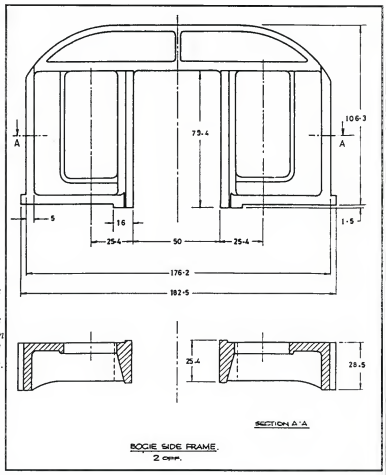
To cut the bogie side frame location slots, 16mm x 1.5mm deep, in the fork end, clamp them on to the milling machine table, square to the table, so the two ends can be milled at the same time using a 16mm end mill. Write down the dial readings as they will be used for drilling the holes in the ends. The 50.8mm between the slots is important as the opening in the side frames is the same size, also the bogie axlebox has to move freely up and down.

Before removing from the mill, the three 6mm holes in each end can be marked with a 5mm slot drill, refer to the dial readings, come in 10mm from the edge of the arm and mark with the slot drill about 5mm deep, lock the table at that setting. Now move the cross slide to the other dial reading and repeat, move the





*Above: this inverted view shows how the arm is attached to the bogie. Left: bogie pivot hole showing coning*



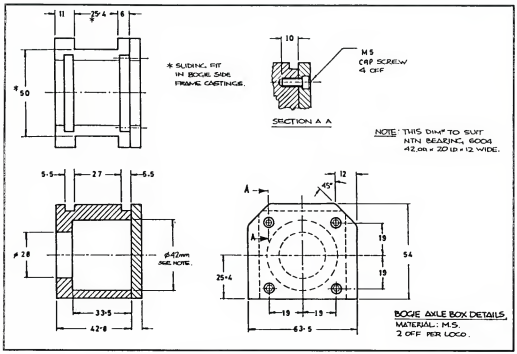

cross slide another 32mm for the third hole and repeat, write the reading down. Move to the other arm and repeat the same procedure. Before drilling the 5mm holes you can use the holes that have been marked to mark out the pivot hole, using a set of trammels. Hold one leg of the trammel against the side of the hole and scribe an arc across the other end of the fork. The point where they cross is the centre of the pivot — check to see if it is 322.3mm from the centre line of the bogie — if not adjust trammels and re-mark.

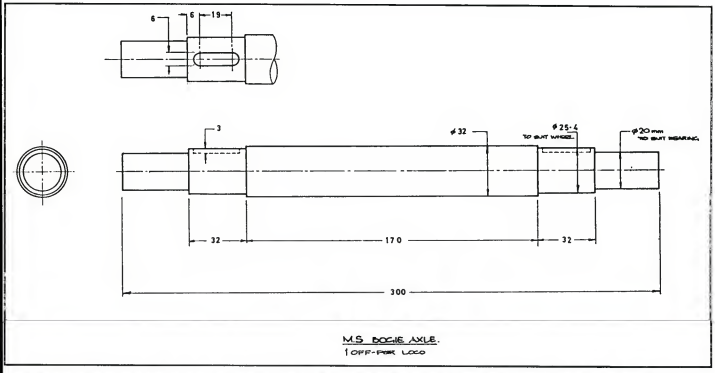
From the pivot hole come back 122.3mm, mark the forks, come in 10mm and mark, then another 16mm (these are for stay brackets and they can be drilled 6mm). The three holes marked with the slot drill can be drilled 5mm. They will be opened out to 6mm after they have been used as a drilling jig to drill the side frames. Drill and ream the pivot hole 22.25mm, turn a bronze stepped bush 35mm diam x 13mm, stepped down to 22.25mm diam x 10mm. It should be a press fit in the reamed hole. Bore to 16mm and cone the bore as the bogie has to pivot and twist on the pivot pin, press in bush.

## Bogie side frames

The bogie side frames are castings. Using an old file (don't wreck a new one as castings very soon take the sharp edge off the teeth) remove any flashing and smooth the casting all over ready for painting. I like to give the casting a coat of red oxide which serves two purposes — it can be used as layout stain ready to mark out before machining and it stops the casting from going rusty and is ready for painting.

First off, measure the casting for size to tell you how much has to be machined off and also if the axlebox opening is in the right place. Clamp the casting to an angle plate, one that has been machined on both ends square to all faces and put two parallel strips between the casting and angle plate and clamp through the two spring openings. Turn the angle plate on its end, find the centre of the axlebox opening and set the vernier height gauge to that setting, write it down, reset vernier, add 25mm more and scribe a line, then take off 50mm and scribe the other line. Now you have the axlebox opening marked out. From the centre add 88.1mm scribe the next line, take away



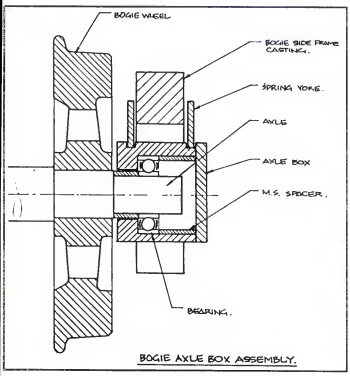



M.S BOGIE AXLE.
1 OFF-PER LOCO

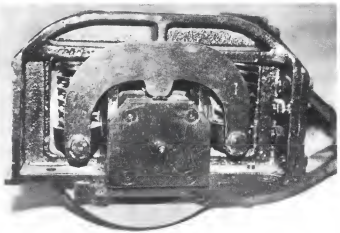
176.2mm and mark the next line (they are for the two cross plates). Now turn the angle plate back on its base to mark out the base and depth off the axlebox opening. From your first measurements you should know how much needs to be machined off (about 3mm) — set the vernier to bottom of the step, scribe a line and then add 1.5mm. Mark then from the first reading, add 79.4mm and mark. That completes the marking out.

Clamp the casting to the milling table using parallel strips, line up base line parallel with the table and clamp down to the table. Mill out the axlebox opening to your scribed lines and take a cut along the base of the casting to your line. This will be the face you will use to set up by. Mill the raised section around the axlebox opening to 1.5mm above the main casting, turn over and clamp the machined face to the table and machine the other step to size (25.4mm). Clamp the casting, end on, to an angle plate using the previously machined base, square it to the table and machine to your lines. Reverse and do the same on the other end, machine the mating casting to the same stage.

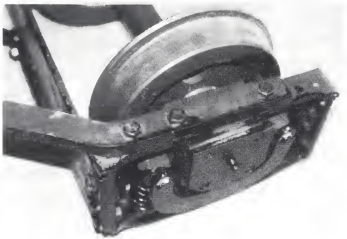
Make a 50mm x 50mm x 75mm block to fit the axlebox opening, put the two castings back to back as if they were assembled. Clamp them to an angle plate with the base of the casting upside down so the step on the

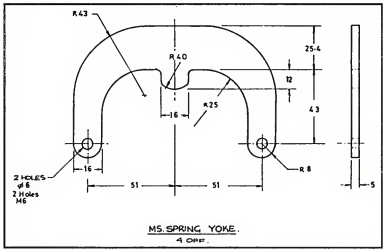



BOGIE AXLE BOX ASSEMBLY.



*These two photos show some of the assembled bogie detail*






base can be machined and when fitted to the **bogie arm** the axlebox openings will line up to each other. Machine a step 16mm wide x 1.5mm deep on both sides of the opening.

## Bogie axleboxes

These are made from 54mm x 63.5mm x 43mm BMS or cast iron. It is a similar operation to the main axleboxes, the only difference being that there is a 45° cut on two of the corners to clear the spring yokes and two slots cut in the top face to locate the spring yokes.

## Bogie axle

Is made from 30mm x 305mm long BMS. It is a similar turning and milling to the main axles, make sure the back to back wheel measurement is 170mm spot on.

## Spring yokes

The spring yokes are cut from 5mm plate. Mark out as per drawing, cut out 4 off on the bandsaw, clamp together and drill the two 5mm holes, bolt together and dress up the spring yokes to finished size. Take apart, open out two of the spring yokes to 6mm, and tap the other two 6mm.

## Swing link pins and washers

There are eight pins and washers and they can be made from 22.22mm silver steel or 4140 (same material as crank pins). They are another straight forward turning job, the only thing to watch being the radius turned on the pins. It is the 2mm radius, where the 11mm changes to 22.22mm due to the big load applied on the pins when the loco is going around a curve. Finally drill 3mm for a split pin. The washer has a 11mm bore x 22.22mm diameter x 3mm thick.

## Bogie frames

These are made from 100mm x 6mm x 313.5mm, two off, with a reinforcing strip welded to the frame. Where the swing pins go through the frame, it is 25mm x 8mm x 96mm. Mark out the frames as per the drawing. The front frame has two extra holes in it — drill all holes 5mm. Bandsaw off the tapered ends and weld on the reinforcing strip, then drill the swing pin holes 5mm and open them out to 11mm. On the opposite side to the reinforcing strip, countersink the hole 45° x 2.5mm to clear the radius on the pins.

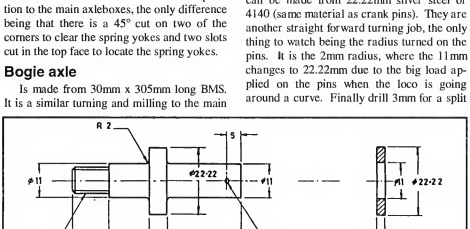
Bolt the cast side-frames to the bogie arm and then clamp the bogie frames to the side frames. Drill the 5mm holes, tap 6mm and open the 5mm holes to 6mm, fit 6mm bolts with lock nuts, so that they now look like the original bogie. While the bogie assembly is still bolted together make the stays which stiffen up the bogie.

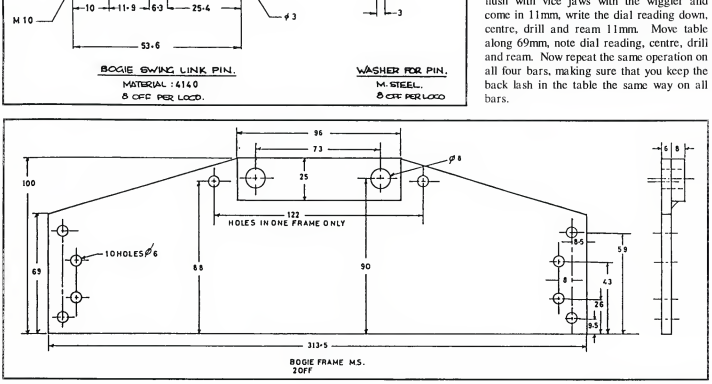
## Bogie stay arms

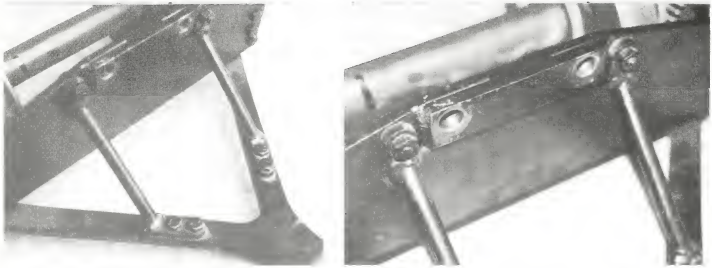
Fabricate these out of 10mm round bar and 15mm x 4mm x 35mm flat bar. Cut the flat bar to size and mark out to drawing, drill 6mm, fit them to bogie arm and frame, then cut the 10mm round bar to size and shape. Tack weld in position and then unbolt the stays and finish welding them.

## Swing links

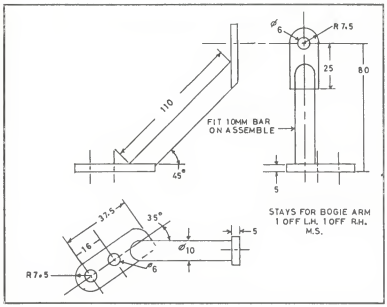
The swing links are made from 22mm x 16.5mm. Cut four pieces 91mm long. Set the machine vice up on the milling machine parallel to table travel, set one end of the bar flush with the vice jaws, set long edge up with a wiggler, then move the milling head over to half the thickness of the bar (11mm) and lock in table. Now set the end of the bar that is flush with vice jaws with the wiggler and come in 11mm, write the dial reading down, centre, drill and ream 11mm. Move table along 69mm, note dial reading, centre, drill and ream. Now repeat the same operation on all four bars, making sure that you keep the back lash in the table the same way on all bars.



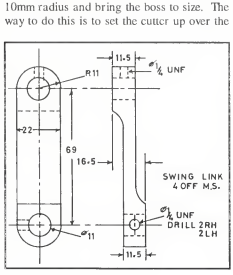





*The attachment of the bogie stay arms is clearly shown in the above two views*




Reset one bar in the vice on a parallel strip with the top of the bar sitting 6mm above the vice jaws. Machine a step 5mm deep x 59.4mm long, repeat on the other three, turn over the bar and repeat in the same way but from the other end. Replace the cutter with a 20mm diameter ball nose cutter to put in the 10mm radius and bring the boss to size. The way to do this is to set the cutter up over the face, already machined, wind the cutter down till it nearly touches the face, slide a piece of paper under the cutter and keep bringing the cutter down until the paper can just slide out from under it. Bring the cutter up to the step and take a small cut now and from that edge, measure and machine off till the step is 21.6mm long. The reason I put the piece of paper under the cutter when the cutter gets a load on it is that it can dig in a little bit and give you an under cut. Make two more 22mm diameter filing buttons and radius the ends. Drill and tap the ends ¼" UNF for grease nipples, two right and left hand.



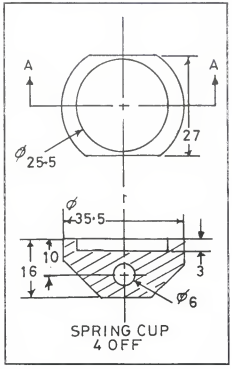

## Bogie swivelling bolster

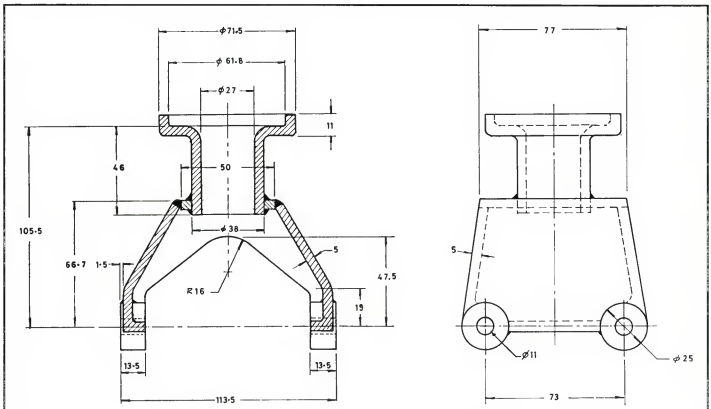
This is a very interesting part to fabricate which requires some turning, bending, welding and milling. It is made out of 72.5mm diameter bar and it is straight forward turning job. The only difference to the drawing is that I turned a step on the end of the pivot so that it made it easer to set up and kept the swivel and the fabricated part square to each other.

The base is made from 5mm plate. The two sides that take the bushes are made out of 100mm x 150mm, a little bigger than required. Before cutting or bending, mark out on a scrap piece of plate the shape of the plate and the size and angle they have to be bent at.

Before cutting the plate in half, mark the centre line and the positions where the two bosses are to go. Next put in a bend 19mm from the centre line and then do the same on the other side of the centre line. Now drill the two 25mm diameter holes, 73mm apart, to take the bosses, mark out the shape of the sides and cut out on the bandsaw. Cut on the centre line and you now have the two sides. The ends are simple — mark out and cut on the bandsaw. The piece that is welded to the swivel is cut from 77mm x 51mm. Mark out the centre, set up in the four jaw chuck and bore to a light press fit on the step already turned on the end of the swivel and put three light tack-welds on the bottom side. Now turn the four 25mm bosses, 15mm long with a 6mm hole through them to make it easer to set up when welding; the 11mm diameter hole will finally be finish machined to size and bosses finished to the correct length in the milling machine.

Clamp all the pieces together (easier said than done) — one way is to lay two pieces of 25mm bright bar on a parallel surface, sit the






BOGIE SWIVELLING BOLSTER.
(-OFF).

two sides on them with the two ends between and put small tack weld on each corner. Check diagonally to see if it is square, sit the swivel, with its plate pressed on, on top of the assembly. Check that it is in the centre of the two 25mm bars and fits in between the two sides with no movement. Next, check the height from the top of the 25mm bars to the thrust surface (it should be 93mm). If it is correct, tack weld, recheck to verify nothing has moved and fully weld up the assembly. The only pieces left to be welded in are now the bosses,which sit out 1.5mm from the sides when finally machined to length. The way to set the bosses up is to make two spacers 98.5mm long with a 6mm hole through them. Take two 6mm round bars and thread a boss, spacer and another boss on each one, line them up centrally with the base, clamp and tack weld. If the bosses have not moved, fully weld them.

To finally machine the bosses, make a stepped bush from 38mm diameter bar x 97mm long, turn a step 25mm long to a neat fit in the swivel, reverse in the chuck and centre the end to take the tail stock of the dividing head. Grip the bogie swivel in the three jaw chuck in the dividing head, fit the 38mm bar you have just machined into the swivel and fit tail stock centre. Line up the side of the bogie swivel with a square of the table, rotate the dividing head 90°, take a light cut off the bosses, rotate 180° and take the same cut off this side. Measure and repeat the process, bringing to the final size of 125.4mm.

Find the centre of the swivel using a wiggler, note down the reading, as this is the reference for drilling and reaming the bosses which is 36.5mm ether side of the centre line. Come down 105.5mm from the thrust face on the swivel (this will bring you on the centre line of the bosses), move the table across the 36.5mm and it should be in the centre of the boss. If it is out a little, do not worry — put an 8mm end mill in the milling chuck and feed through the boss. It is a good idea to put two bottle jacks under the bottom of the two bosses so the bogie will not rotate while machining the holes, drill and ream the hole. Rotate the bogie 180° and repeat for the other side, move the milling head over 73mm and repeat the same on that side. This completes the bogie swivel.

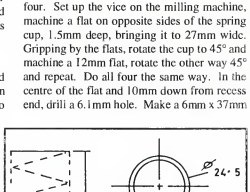
## Bogie centre

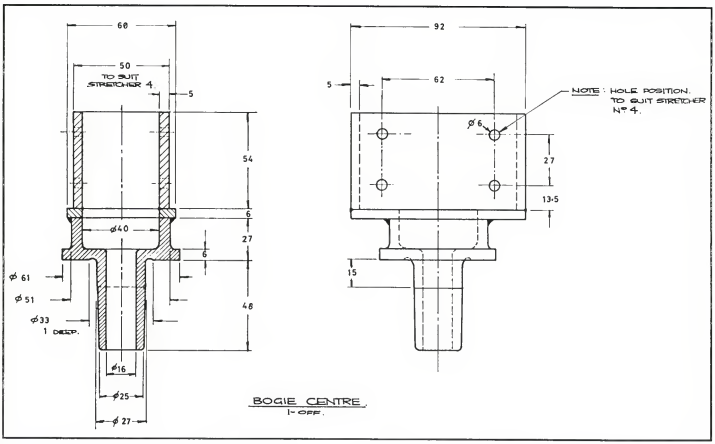
The bogie centre is another turning and fabricated box section. Make up the box from 5mm plate to the drawing. The box needs to be welded on the ends on the outside, grind a 35° bevel on the mating pieces to get a solid welded box construction — if welded on the inside at the ends, the welds might not clear the holding bolt nuts. Tack weld the box together and check for square and size, run a small bead of weld around the bottom of the inside of the box to hold the sides to the bottom,finish welding the ends of the box, dress up the welds, mark the centre of the box, set up in the four jaw chuck and bore to 40mm.

Use a piece of 61mm diameter bar and turn the centre pivot to the drawing. Before welding the pivot to the box drill and tap the ¼" UNF hole to take an extended grease nipple, make a 40mm plug, fit the two parts together and weld all around. Fit the pivot in the centre of stretcher number four and drill the eight 6mm diameter holes (you may have to take out the stretcher to drill them).

## Spring cups

These are turned out of 30mm diameter bar, set up in the three-jaw chuck and counter bored 25.5mm diameter x 4mm deep to retain the spring. Part off at 16mm long, making four. Set up the vice on the milling machine, machine a flat on opposite sides of the spring cup, 1.5mm deep, bringing it to 27mm wide. Gripping by the flats, rotate the cup to 45° and machine a 12mm flat, rotate the other way 45° and repeat. Do all four the same way. In the centre of the flat and 10mm down from recess end, drill a 6.1mm hole. Make a 6mm x 37mm






bolt with 8mm length of thread. The bolt goes through one spring hanger, spring cup and screw into the back spring hanger on assembly.

## Bogie springs

I used some car valve spring I had on hand. I am not sure what car it was out of but the size is 25mm diameter x 51mm long x 3mm gauge and it had 8 free turns and the ends were ground square.

## Bogie Pivot Pin

The pin is made from 20mm hexagon BMS. Turn a step 12mm diameter x 17mm and thread 12mm x 14mm long, turn another step 16mm x 21.5mm, part off 45mm long over all, reverse in the chuck and face the hexagon and champfer the corners.

*To be continued ...*

*Steam Chest continued from page 28 ...*

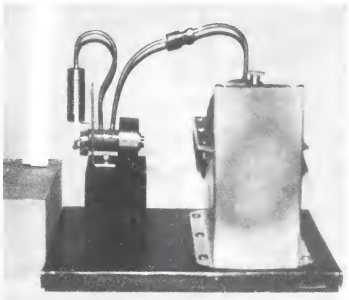


Photo 5

One thing I noticed was that the illustrations of the early engines were mostly beautiful engravings probably taken from builder's catalogues or the early textbooks. Later engines have good photographs and some line drawings, but they don't have the same appeal (to me, at least) of the old engravings.

There are pictures of many of the weird and wonderful engines produced in the mid 1800s like the trunk engine, side lever (**Figure 4**) and oscillating engines, just like the ones we reproduced from *Burgh's Modern Marine Engines* a year or so ago. For anyone one with an interest in the history of marine engineering this is a wonderful read, and who knows, someone might shout you a copy for Christmas!

## Travels with Kenny

As our more observant readers may have noticed, this item has been missing for a couple of issues. The main reason is that there has been so much other stuff to fit in which I considered of more interest to most readers. Looking through the rest of the story, it appears I've covered all the most interesting parts anyway, and for the rest of the trip we didn't see much new in the way of stationary engines. Judging by the amount of stuff I still have in my Steam Chest File, I think it best to close the TWK series now. I'd like again to give a heartfelt thank you to Kenny Saunders for putting up with me for that fortnight, and to Peter Lukey for his help in setting up visits to sites that would have otherwise not have been accessible. Plus of course he and Gwen put us up for a night!

From comments that several readers have made, our experiences were followed with some interest and even envy! I guess that was the purpose of the articles, so thank you for the positive feedback. And please keep sending photos of your models!

### Steaming on the Net!

One of the reasons I'm collecting so much steam stuff now is that I've finally taken the plunge and hooked up to the Internet. Not only does this enable me to send and receive e-mail but it has opened up a huge source of research material. I have several quite exciting items in the pipeline currently, and I've hardly scratched the surface! It's also cost me a fortune in books, as many book dealers list their stocks on the internet and I've tracked down a couple of titles to flesh out my library.

So, I can be contacted by e-mail at:
**sandave@bytesite.com.au**.

If there is sufficient interest I will run a regular section in Steam Chest on stuff available on the net. Let me know if you are interested!

Until next time, happy steaming!

# Second Machine Tools

**by Peter Dawes**

Sooner or later we decide to upgrade our lathe or other machine tool. We tend to think of selling the old one, but the advice to be given here is an emphatic DON'T. Every machine tool I have ever bought has had some improvements made to it and these have required the services of the same tool that is being worked on but is currently lying in bits on the floor.

Often I have had a job that required the fitting of a number of small parts to larger ones. I have retained the large part in the lathe while I made and fitted the small parts with the original smaller lathe. In some cases I could not have even contemplated the job without the second lathe.

Easily the most important machine modification that I have made is to add a clutch to a 6" geared head lathe. I wrote that up in A.M.E. I could not have done it, designing it as I went, without using my very old 4.5" South Bend clone.

Taiwanese machine tools can be nasty, but one thing they certainly are is cheap. I have equipped my whole workshop for less than the price of one fancy European tool-room quality lathe. But that doesn't mean Asian tools should be accepted as they come. We trade our time to save some of the first cost, in most cases this refurbishment means having access to a tool the same as the one that is being modified.

So unless you are critically short of space, hang on to the old one. Unless it is in mint condition you won't get much for it anyway. The truth is, it's worth more to you to keep it.

# Piston Rings Without the Tension

**by Ed Murrell**

*Drawings for publication by Peter Manning*

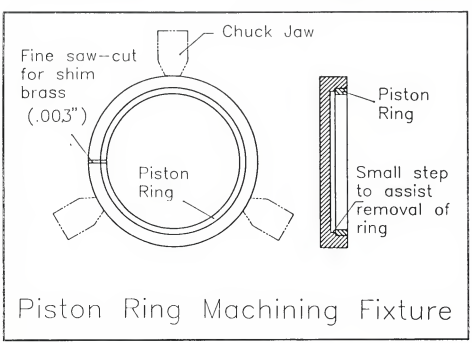
A lot of builders use commercial rings as used in petrol engines and the like. These have to stand a compression pressure of 160 lbs or more, and an explosion pressure many times that. Hence the high tension the ring has in order to do the job.

In a steam cylinder, on the other hand, 80 lbs at most is usual, which does not require even a third of the tension, which in any case causes excessive drag and wear

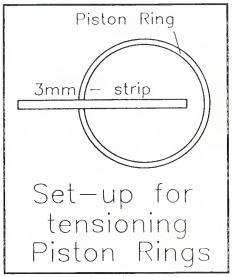
Reducing the tension means reducing the thickness, not the width, and it is not difficult to do this. Turn a disc in the lathe for the ring to fit in and then, with a fine saw blade, cut a slot to match the ring gap. Insert a piece of shim brass — this has to make the ring tight in the jig and stop it turning. With a fine pointed tool and fine cuts, reduce the ring to 2 mm thick, which is plenty, but that is up to you!. Rings must have a side clearance of .002". this allows the compression to get under the ring and press it against the cylinder. (The same applies with 'O' rings but they need more side clearance).

To improve the tension, lay the cast iron ring on a flat surface with a 3 mm strip inserted in the gap, then heat to red and allow to cool.

I have heard it said that cast iron rings cannot be used in bronze cylinders. I have used them in bronze cylinders on several occasions with success. They are in the cylinders of a *Speedy*, fitted about twelve years ago and still going as good as new! The tension however, must be reduced as already explained.

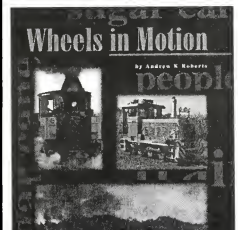


Piston Ring Machining Fixture



Set-up for tensioning Piston Rings

# Product Reviews




## Wheels in Motion

*by Andrew K Roberts*

An attractively presented introduction and guide to the sugar mills and their railways in Queensland. The author is obviously enthusiastic about his subject matter, which, when you consider his occupation as a motorman at Farleigh mill, makes for a man happy in his work, and this shows through. The book deals with each mill in turn starting with Mossman Mill in the north and following all the mills which have railways in sequence, down the coast to the Morcton Mill at Nambour. The format of the book is fairly simple as each mill was requested to provide a short history along with a map of its railways. In addition, some of the characters of the sugar industry were sought out and the resulting anecdotes and reminiscences from drivers, both past and present, and other hands make this book a very entertaining read.

A current (1997) loco fleet listing and a tramway map is provided for each mill. The loco listing is fairly detailed and by and large the tramway maps are excellent, with a couple of exceptions. As this material was supplied by various individuals, a variety of styles is to be expected and this should not be taken as a negative - all relevant information is included. Likewise, the mill histories were provided by individuals and some are more detailed than others. As well as the histories, maps loco listings and anecdotes, there is all sorts of other information provided which varies from mill to mill. There are details of mill tours, souvenirs available, related publications and personalities revealed..

The photographs cover a wide range of locomotives and related activity. Some 60 photos are of a historic nature and concentrate mainly on steam locos, whilst the remainder (about 100) are of the modern scene with most of these photos taken during the 1997 crushing season. In a few cases the photographs are a bit lacking in detail, due mainly to the fact that most shots of cane locos at work are taken in the middle of the day when the sun is high overhead. This leads to the lower part of the loco being in shade and that part of the picture being very dark. The majority of them are very good and have reproduced well. The cover of the book is very eyecatching and most attractive, all colour shots, front and rear, being very good. They are nicely contrasted with a black surround.

I can think of other information which might have been included, like cane bin details, track facts and figures etc., but where do you stop. To cater for everyone, Andy would have ended up with a book about 2 inches thick and consequently very expensive. Given the broad nature of his subject matter, he has done well. The book is a limited print run, 500 copies only, and will probably sell well. It certainly rates a place on the shelf of every enthusiast of the sugar railways of Queensland, and should hold appeal for narrow gauge fans generally.

**Wheels in Motion**

By Andrew K Roberts. Published 1998 by the author

152 pages, A4 size. Full colour soft cover; photographs 12 colour and 169 black and white; one diagram and 23 maps.

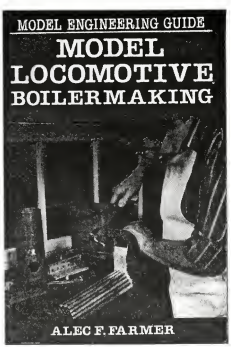
**Price**: $36.00 (plus postage and packing)

**Available from** : the author, C/- Post Office, Eton, Qld 4741 (07) 4954 1206.

***David Proctor***

### PRODUCT REVIEWS

Prices stated in all product reviews are those quoted by the supplier and are current at the time of going to press. As there is no guarantee of prices remaining unchanged, it would be adviseable to get a firm quote when you place your order.




## Model Locomotive Boilermaking

*by Alec F Farmer*

It would be fair to say that the name Alec Farmer is known world wide. This is certainly so for anyone who has been in the game for a few years and has been a reader of the English Model Engineer. The Club Programmes there often showed talks by Alec.

I have seen examples of his work and consider them to be first class. I even have on record one of his boilers fitted to a 3½"g *Princess Marina*, in the Illawarra Live Steamers that predates the AMBSC Codes and never sheds a drop.

This book, of 191 pages, is a photographic record of the talks he gave on the Club circuit. Each photo is numbered and descriptive notes explain each sequence. The boiler being described is Martin Evans' *Torquay Manor*, a 5"g GWR design.

Whilst this book describes a series of methods to successfully build a miniature boiler, there are certain things that are not allowed with AMBSC Codes. The use of the Castellated Joint on the barrel is out, but of course the method used to produce the barrel is certainly okay — you use a butt strap. The same applies to silver soldered stays. Stays up to 300mm in length may be done this way but over that the use of bushes and nipples/nuts must be used (see AMBSC Copper Boiler Code).

The table on Page 15 giving nominal percentage composition of brazing/silver soldering alloys is probably best glossed over as our tables do not seem to tally. However the rest of that section, Safety Note, should be read and the advice taken on board.

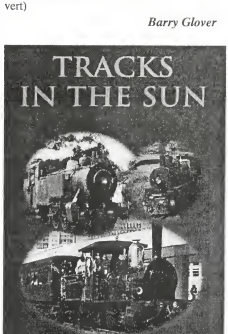
All in all if you are thinking about building your first boiler then you can't go wrong with it in your library. The same applies to those who have built a couple and still haven't set-

tled into a method or routine. Just as I was finishing my 16th copper boiler I found a tip that was a winner. The problem with boilers is that the average model engineer only builds one every 'Pancake Day'. It is certainly a case of "practice makes perfect" and Alec has had plenty of that.

**Model Locomotive Boilermaking**
by Alec Farmer
published by the author. ISBN 1-85260-007-1

**Available from**: Camden Books (see advert)

*Barry Glover*




## Tracks in the Sun

*A Queensland Perspective*

*Tracks in the Sun* is the latest video devoted to the subject of Queensland Railways. It offers a mixed approach ranging through the modern, the QR Heritage steam fleet and into the future. The modern is represented by footage covering the huge coal trains of central Queensland and the *Westlander* travelling down the range from Toowoomba towards Brisbane. The QR Heritage Fleet is a group of steam locomotives restored and maintained by Queensland Rail for special operation. Members of the fleet featured in this video are an A10, PB15, C17, DD17, BB18¼, and Beyer Garratt. The future is represented with footage on the high speed Tilt Train which will be in revenue service by the time you are reading this. A bit of nostalgia sees some now withdrawn diesels in operation as well — all in all, a good cross section of QR motive power.

The video begins with an opening sequence which features many brief glimpses of the operations of QR, accompanied by a commentary which sounds more like a commercial for Queensland Rail. Fortunately the commentary changes very quickly once the title sequence is over and settles down to a very informative narrative, spoken at infrequent intervals to allow the viewer to hear and appreciate the sounds of the various locomotives at work.

The first segment, one of my favourites, is devoted to A10 locomotive No.6, probably the oldest working steam locomotive in the Southern Hemisphere, and one of the world's oldest which still operates on main lines. We see some excellent footage of the restoration of the locomotive at the now closed Mayne shops and its inaugural run around Brisbane, some parallel running with a PB15 and some old footage which shows the locomotive in service on the lines of the Bingera Sugar Mill.

We then move up to Central Queensland and the very long coal trains which operate into Gladstone. There are many views of these trains whose length is measured in kilometres and the powerful electric locos on the front and in the middle of the train. The emphasis is on size, but never once are we allowed to see a complete train passing the camera, which is a bit of a shame for those who have not seen these trains up close. Having once lived near these lines I can vouch for the excellent sound reproduction. Further south, we follow a now withdrawn 1620 class diesel up the since closed scenic Mary Valley line from Gympie. (This line is now operated by a tourist railway.) The train is a shunting service to the pineapple sidings at Amamoor and the timber mill at Melawondi, and the distinctive English Electric growl of the diesel is very clear.

Continuing on the branch line theme, the video then moves on to the Brisbane Valley line, which follows the Brisbane River up to the Blackbutt Range. PB15 No. 732 and a 1600 class diesel make the slow trip up grades of 1 in 50 with curves down to 5 chain radius, and the nature of the line is well illustrated with some great footage.

Travelling down the range from Toowoomba with the *Westlander* tends to get a bit monotonous. The trip could have been made more interesting through this rugged country, with 1½ hours being allowed to travel the 40k with its steep grades and tortuous curves, but the opportunity is lost with endless views of the driver and looking forwards from the rear of the cab. The same can be said of another section where we ride railcar 1901 from Stanthorpe to Toowoomba and we have endless side view shots of the driver. In fairness though, it is probably more difficult to get variety with a single railcar.

The last locomotive built at the Ipswich Workshops was DD17 class No. 1051, now restored and operating under the name *Blue Baby*. We are treated to some fantastic footage of the loco at work with close up views of moving parts on the Westinghouse pump, lubricator etc. Stuff to stir the oil in any steam buff's veins! The loco is seen hauling a train of the stainless steel SX cars (which it used to haul in revenue service) on a picnic special to Darra. A return trip to Millmerran behind C17 No. 974 on the other hand, is rather mundane as the lighting seems to be rather washed out and the locomotive is often silhouetted against the background. A large proportion of the trip is seen looking into a fairly dark cab or forward over the top of the engine. Some variations would tend to indicate that the lighting is the result of the large sky and distant horizon in this fairly flat country. The return trip is almost a carbon copy. Shortening of this segment of the video could have been compensated by leaving in some footage on the coal trains, enhancing the overall production.

The final steam feature is BB18¼ No. 1079 heading from Roma Street to Winton for, if my memory serves me correctly, (the video doesn't say) the Waltzing Matilda celebrations a couple of years ago. We see some good footage of the train between Brisbane and Rockhampton, but a golden opportunity was missed by not including any of the trip once the train was out from under the wires and west of Emerald. The Drummond Range would be one of the best locations in Queensland for filming trains. The finale, if you like, is the construction and testing on the track of the new Tilt Train by Walkers Limited, which is most impressive.

The producer, Mike Condon, is employed in the television industry and comes from a family which has been closely involved with Queensland Railways for several generations.

The video, at 105 minutes, is not short. There is some very good footage throughout, in some cases exceptional, but in a few cases, let down by the editing. Music has been kept to a bare minimum, as has the narration, with the stated aim of letting the viewer appreciate the sounds of the trains. The producers have really succeeded with this. An accompanying leaflet gives some information about the producer, small map of Queensland Railways, history and technical details of some of the locomotives and some history on some of the lines featured. There is a natural place for this video in the collection of anyone interested in railways — and for the QR aficionado, its very desireable.

**Tracks in the Sun**
VHS, PAL, 105 minutes, Colour
**Available from**: Series 567 Rail Video, PO Box 554, Sunshine, Vic. 3020
**Price**: $39.95 plus $4.00 postage
(Payment by cheque, Money Order, credit card)

*David Proctor*

# A Kerr Stuart *Wren* Class Locomotive

## Story and photos by Doug Chambers

In 1990 I found myself looking for another steam locomotive to build. I had already completed three 5 inch gauge designs, these being Simplex a Southern U Class, Ashford and the elegant Midland Single, Princess of Wales. This time I wanted something different. I felt that there was a need for a locomotive in our Society (Palmerston North Model Engineers) that would be a good passenger hauler, simple and easy to drive — ideal for training up and encouraging new drivers and potential locomotive builders. Difficulty reaching over a tender meant that a tank loco was probably going to be a better proposition. However, the bunkers on a lot of standard gauge tanks would make it difficul to fire unless the bunker was removed for driving, which detracts from the appearance of the locomotive.

Finally, the Wren was decided on. It meant building a 7¼" gauge, but as the full size loco was very small (two foot gauge and weighing only four tons) the model obviously was not going to be very big. Ken Swan in England had produced a very fine set of drawings and with these in hand a start was made. I made the wheel patterns and had the wheels cast in a local foundry. Being an 0-4-0 meant there were no bogies or pony trucks to worry about and production of the frames was very straight forward. The axle boxes were made up from cast iron, but instead of making leaf springs as in the drawings, I chose to use coil springs. The spring travel on the rear axle is kept to a minimum as this axle drives the crank for the Hackworth valve gear which is affected by the position of the axle and crank in relation to the expansion link and die block.

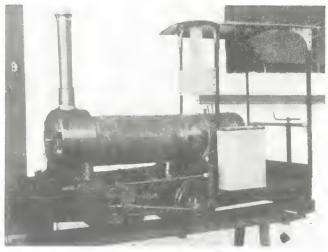
Instead of making patterns for the cylinders and valve chests and having them cast at a foundry, I bought some short lengths of "flo-cast" iron bar and machined the cylinders and valve chests out of the solid. Very easy to machine (no chill spots or sand skin to work through). The pistons and piston rings were made from the same material.

### The boiler

The Boiler is of copper and produced no problems in its manufacture. The fire box and outer wrapper sheet have straight sides, there being no need for a "waist" to fit in between the frames. There is no superheater and there is no tendency for the locomotive to "run wet".

*The boiler completed and tested hydraulically*

The regulator is one of the locomotive's best features. The regulator body is mounted on the front tube plate outside the boiler, in the smoke box. It has a conventional slide valve that is moved by a stainless steel rod that goes right through the boiler from the back head. Steam is drawn from the top of a fairly high dome to ensure that the steam is as dry as possible. However the feed from the mechanical lubricator is arranged so that oil enters the regulator housing in the area above the slide valve subjected to boiler pressure. The oil lubricated regulator is very smooth in operation, a feature that is appreciated by drivers trying to make a gentle start without spinning the wheels and showering the passengers and driver with sparks from the funnel.



*The loco takes shape with boiler, smoke box, valve gear and chimney all fitted*

For obvious reasons you cannot do this to locos with a regulator inside the boiler or a loco fitted with a super heater. The former, because of oil contamination in the boiler water and the latter, because the oil would become excessively heated and turn to carbon in the super heater elements — the pistons and valves would suffer from a lack of lubrication.

### Feedwater supply

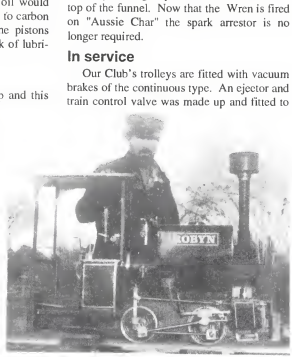
There is a neat crosshead pump and this was made albeit with two alterations. The drawing specified a ¼" ram but to ensure an over capacity I fitted a 5/16" ram. The second alteration was to the operation of the pump. Following the prototype the plans called for a valve fitted that would choke the water supply to the pump, thus starving the pump of water. I prefer to have the pump pumping all the time, whether to the boiler or by passing back to the saddle tank, so I re-arranged the piping and valve to achieve this. An injector made by another Palmerston North model engineer was fitted and has proved to be most reliable.

### Completion

Final fitting up was straight forward. The cab roof and supports had to be made quickly detachable as the loco was too high for our station wagon. The boiler was hydraulic tested in August 1992 and the Wren had its trial run the following June. All went well although when the locomotive entered passenger service it was found that the Waikato coal tended to break up into small parts causing sparks to descend onto the passengers to their obvious discomfort!! This was initially overcome by making a spark arrestor that fitted on top of the funnel. Now that the Wren is fired on "Aussie Char" the spark arrestor is no longer required.

### In service

Our Club's trolleys are fitted with vacuum brakes of the continuous type. An ejector and train control valve was made up and fitted to

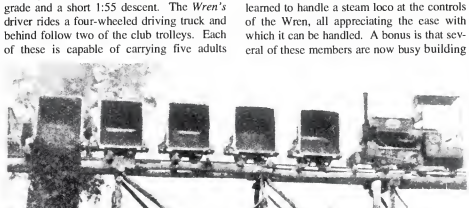



*A very satisfied builder after an afternoon's run, with fire dropped and boiler blown down*

*Richard Lockett driving at the Kapiti Miniature Railway in Raumati. The steam near the coal bunker shows that the ejector for the vacuum braking is turned on.*

the *Wren*. The Palmerston North Model Engineers track, known as The Marriner Reserve Railway is 480 metres long with a 1:70 up grade and a short 1:55 descent. The *Wren's* driver rides a four-wheeled driving truck and behind follow two of the club trolleys. Each of these is capable of carrying five adults making a respectable load for a locomotive that weighs about 250lbs or 105 kilos.

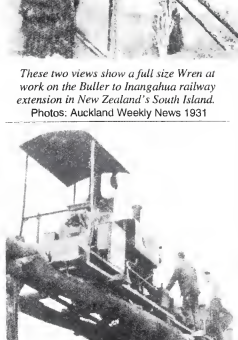
About seven or eight of our members have learned to handle a steam loco at the controls of the Wren, all appreciating the ease with which it can be handled. A bonus is that several of these members are now busy building



*These two views show a full size Wren at work on the Buller to Inangahua railway extension in New Zealand's South Island.* Photos: Auckland Weekly News 1931

their own locos and a spell at the controls of the *Wren* sees them encouraged to keep on with their locos.

After 220 miles had been travelled it was noticed that the cast iron wheels were wearing quite severely. The axles and wheels were removed and steel tyres were fitted. The steel tyres grip the rail better and there is less tendency for the loco to slip. Apart from this one fault the loco has been remarkably trouble free and to my delight after covering about 650 miles has yet to be withdrawn from service through breakdown.



## In general

I recommend the *Wren* for anyone wanting a simple, quick to build loco powerful enough to do its share of passenger hauling. The simple valve gear makes it an ideal project for the "first timer". Although most 0-4-0's are very lively on the track and appear ready to leap off the rails on any alignment imperfection, the *Wren* is very stable. One impressed driver described it as having a "gait similar to that of an elderly, fat pet duck" as it just calmly waddles along. Soon after completing my *Wren* I built the boiler and cylinders for another that is being built by one of our club members.

Unfortunately, early in 1995 I suffered a back injury and am now no longer able to fold myself up enough to drive on a ground level track. Our Club treasurer and great friend Richard Lockett now has custodianship of the *Wren*. Under his care the loco has run at Havelock North, Tauranga, Hamilton and Raumati, continuing to give pleasure to all.

The *Wren* was named *Robyn* after my wife, an Australian lass whom I met and married while working in Melbourne 1968-70 and without whose support and encouragement I could not have built the locos I now have. It has caused some consternation to other members when Richard (a bachelor) says that he is taking *Robyn* away to Hamilton for the weekend, until he makes it clear that it's *Robyn* the locomotive and not my wife he's taking away.

## The prototype

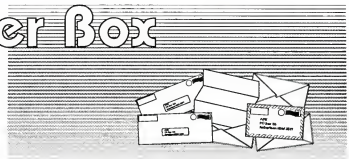
Construction of the model was well on the way before I found out any details of the prototypes. About 150 *Wren* class locomotives were build between 1900-1935. The last six were built by Hunslet after the Kerr Stuart company failed.

There were two models and there were major differences between them. The earlier version had Stephenson valve gear and the cylinders were parallel to the centre line of the axles. Because of the rough nature of the narrow gauge lines the *Wrens* were used on, there were problems with excessive wear on the Stephenson valve gear eccentrics and sheaves due to the small wheel diameter allowing dirt and grit into the moving parts. Large stones were responsible for knocking off the cylinder drains due to the low ground clearance under the cylinders.

On the second model, Hackworth valve gear was used removing the need for eccentrics and sheaves. The cylinders were inclined and this raised the cylinder drain cocks higher, making the hazard of rocks knocking them off, less likely.

Kerr Stuart exported their *Wren* class locomotive all over the world. On the Falkland Islands there are the remains of two of the early series. In Cape Town there is one of the later series restored and working. There are about five in the United Kingdom, all restored and there are three here in New Zealand. One worked on a three foot gauge track at Tolaga Bay north of Gisborne. Two more were used by the Public Works to construct the New Zealand Railways line from Buller to Tauranga. After that job was completed one was sent to the Puponga Coal mine and the other assisted in the construction of the NZR line from Buller to Inangahua on the completion of that job it too went to the Puponga Coal Mine. The boiler of one of these still exists. The Public Works *Wrens* were both two foot gauge engines.

# Letter Box



## Invisible welding?

Sir,

Richard Butcher's Excellent article in AME Sept Oct 1998 on *Welding Repairs on NSWGR Steam Locomotives Frames* set me once again pondering. One of the unexplained mysteries (to me anyway) is the work done altering the NSW 12 class from a 4-4-0 configuration tender locomotives to become the 4-4-2 tank locomotives of the 13 class.

Ron Preston in his definitive work on these classes of locomotive, *Tender Into Tank*, says, (p59) "The frames of the twenty year old express engines were lengthened." My question is, "How was this done?" Examination of the remaining 13 class locomotives at the Rail Transport Museum at Thirlmere failed to show any sign of extension. Electric welding as discussed by Mr Butcher was not in use in the railways in 1902, according to John Faul, an old railway welder, teacher of welding and knowledgeable rail historian. This should mean a riveted joint with extensive butt straps each side.

My best chance to examine a 13 class frame set was at Parramatta Park before their fire. They had the frames of 1308 up on blocks, totally stripped and freshly painted. There was no sign whatever of any evidence of a join. One possibility is that all, at least all of those still in preservation, were given brand new frames some time during the course of their long and illustrious careers.

Is there someone who can please solve for me this one of life's little mysteries?

Bruce Allen

New South Wales

## Thankyou

Sir,

I ask that you allow me, through these columns, to say thankyou to all those who called to enquire about my personal well-being, and also the I.L.S. facilities, during the recent Wollongong flooding.

My house suffered no damage; the 8 inches of water through the workshop was nuisance value, as was the 5 feet of water over the club grounds. We lost nothing compared to others who lost all. One of our members lost his new car and suffered water in his home.

One thing that showed through all this was the fact that people from right across the country took time to call, offer assistance if needed, clubs offering monetary assistance, all in the great Australian tradition of helping your mates. It is certainly gratifying to know that this spirit is alive and well in the Australian model engineering world. On behalf of I.L.S., my wife and myself, thankyou all.

Barry Glover

New South Wales

## Adapting to CNC

Sir,

I am interested in adapting a small milling machine to CNC operation via my notebook computer and wonder whether any of your readers in Australia are interested in a similar venture. This is how far I have got:

1. I have seen mention of it in a magazine *Model Engineers' Workshop*.

2. I acquired some stepper motors (Unipolar, 6 wires, some of 53 in. oz. torque, some of approx. double that, rated at 5.1V at 1.0A and 1.9A respectively.)

3. I made some enquiries with a company *Altronics*, who kindly sent me copies of an article about their product K2830 entitled *Control Stepper Motors with your PC*. I understand that their control board will control two motors, while I would require control along X, Y, Z axes.

4. My training was in mechanical engineering and quite a large portion of the Altronics article on the puising control of the motors via bridges and transistors goes over my head.

5. I understand the company supplies the parts in kit form to be soldered together by the customer as well as accompanying software on a 3.5" IBM compatible floppy disc.

I would appreciate any help and/or further discussion.

Arnold Thuys

South Australia

## Modelling stresses

Sir,

I am responding to Mike Thurgood's letter in the July-August issue of AME.

It is true that the cross sectional area of scaled down parts varies as the square of the linear dimension. It is not true, however, that the stress resisted by scaled down sections follows the same principle. This is because the forces causing these stresses are generated by smaller areas under pressure or by the smaller masses of component parts.

A scale model, perfect in every detail and operating at the same boiler pressure and RPM of the driving wheels or the crankshaft, would endure the same or reduced stresses in its static and moving parts. Some of the relationships between full size and scaled down models are given below.

- For parts resisting static or dynamic pressure loads, eg. cylinder covers, steam domes, pistons and piston rods, the stress is the same.
- For parts resisting static circumferential pressure loads, eg. boiler shells and cylinder castings, the hoop stress is the same.
- For parts resisting torsional loads, eg. propeller shafts, the stress is the same.
- For parts resisting loads due to gravity or acceleration, eg. drawbars, the stress varies as the scale. That is 1/10th scale endures to 1/10th stress.
- For parts resisting loads due to simple harmonic motion, eg. reciprocating parts, the stress varies as the square of the scale. That is 1/10th scale endures 1/100th stress.

These relationships hold true only when operating pressures remain the same and when true scale dimensions, speeds and RPM are used. A simple example could be a round cover restrained against boiler pressure by a single bolt. (see table)

If we built a true scale locomotive for example, combustion and gas flow principles, not to mention the general fragility of the engine, would make it impractical to operate. I don't believe we would gain boiler approval either!

| | Full size | 1/10 full size |
|---|---|---|
| Cover dia (R=0.01m) | 200mm (R=0.1m) | 20mm |
| bolt dia | 20mm (r=0.01m) | 2mm (r=0.001m) |
| boiler pressure; | P=700kPa (700000pascals or 700000N/m$^2$) | |
| Cover area; | A=$\pi R^2$ 0.03142m$^2$ | 0.0003142m$^2$ |
| Bolt area; | a=$\pi r^2$ 0.0003142m$^2$ | 0.000003142m$^2$ |
| Force on bolt; | F=PxA 21991 N | 219.91 N |

I hope I haven't muddied the waters too much, and thanks for a great magazine which is eagerly awaited.

Peter Toohey

Queensland

## WDLS says farewell

Sir,

It is with regret that I inform you of the death of E W (Bill) Kirk on 4 August 1998. Bill was a member of Western District Live Steamers for many years and was elected to Life Membership following his stroke in 1989. Bill was a caring and helpful person

who was always there when needed, he had a witty sense of humour. For those who knew him, he was "Mr Nice Guy" who made friends easily, putting others at ease. Bill's last years were spent in Bethel Nursing Home at Ashfield as he became increasingly frail and totally dependent.

Bill, I thank you for being who you were, for your ever friendly smile, for your patience and understanding. It is with heavy hearts that all your friends at WDLS say goodbye.

Neil Matherson

New South Wales

Sir,

Joseph Sutton, one of WDLS's self taught model engineers passed away on 1 July 1998, aged 84. Joe had travelled around many of the clubs and had made many friends. In fact his last trip was to the Wagga Wagga club in November 1997.

He was a chicken farmer, then worked at Cardiff and Chullora Railway Workshops and finally finished his career as a storeman for Blackwoods. During the war he was in the army serving in the Middle East. As an active model engineer, Joe built 11 locos and assisted many others to complete theirs. He also built model marine engines, boats and stationary engines.

Joe will be remembered for his generosity in teaching and allowing others to drive his models and for passing on his wide knowledge of steam powered vehicles. Our condolences and best wishes are extended to his wife Peggy, and the family he left behind.

Peter Martin

New South Wales

## Goldfields water supply

Sir,

Thanks for the July-August 1998 issue of AME. It's great reading as usual. I noted Dave Harper's remarks about the Goldfields Water Supply in his *Steam Chest* column and thought you might like more information.

This water supply scheme is one of the engineering masterpieces in Australian history. It was built in the five year period from 1898 to 1903 to provide water to the towns of Coolgardie and Kalgoorlie in Western Australia. The water was (and still is) collected in a large dam in the Darling Ranges just to the east of Perth, and pumped about 560 kilometres to Kalgoorlie.

As Dave mentions, there were originally eight pumping stations , all I believe with two identical steam pumps. At least two pumps are still in existence. At number 1 pumping station at the foot of the dam wall, one pump and a boiler, and the pumping station building, have been preserved and developed as a museum. At the Cunderdin station, which I think is number 4, the pumping station building and one pump have been kept. Again the building and the pump are part of an interesting museum.

The pumps are horizontal and huge. I think they have Corliss valve gear - certainly looks like it... The system was designed and built by C Y O'Connor who was the Western Australian government's chief engineer at the time. Political outcry and media assassination led him to take his own life in March 1902. C Y O'Connor also had a very substantial hand in the development of New Zealand's railways and the railways of Western Australia. He also designed the port of Fremantle.

Water was pumped 351 miles from Mundaring Weir to Kalgoorlie and raised well over 1000 feet along the way. It cost about $2,500,000 at the time. Some 60,000 steel pipes, 30 inches in diameter were made in Melbourne by Mehpan Ferguson and in Sydney by Hoskins Brothers, using imported steel. Given the time when it was built, this pipeline ranks with the Trans Australia railway, Sydney Harbour Bridge and the Snowy Mountain hydro scheme as one of Australia's major engineering feats.

The pipeline now serves many regional towns along its route in addition to Coolgardie and Kalgoorlie.

I am researching the pipeline at the moment with the intention of writing a book on it in the future. An article for AME would certainly be appropriate.

Dick Langford

Western Australia

## Articulated cars

Sir,

With reference to Ross Bishop-Wear's letter in the July-August 1998 issue, and to answer *some* of his questions, I offer the following explanations, having been involved in the preliminary design (evolution) of the Canberra articulated cars.

- 1. The current articulated cars have developed from a desire to improve the *existing* riding cars. This has been carried out over a number of years as outlined in the article in the May-June issue.
  (a) padded seats were the first improvement and
  (b) widening the footboards with a lip was the second step.
- 2. With the development of the AAR bogie with larger wheels came the idea of fitting them to the existing riding cars without the major rebuilding that would have been necessary to fit the much larger bogies *under* the existing cars. Hence the idea of fitting bolt-on frames.

To fit the new bogies under the existing cars would have entailed a major reconstruction of these riding cars. The current arrangement allows the existing cars to revert to the single car arrangement with under frame bogies if required and, pending the design and construction of new riding cars incorporating the AAR bogie, proved to be a worthwhile step in the comfort of the articulated car set over the previous single cars with the smaller bogies.

New designs of riding cars with larger wheels and under-frame bogies are already in use in other clubs — see Ivan Evans', Graham Clarke's and Royden Bourke's fine examples.

David Dunnet

Australian Capital Territory

## Spark eroders

Sir,

One of your readers, who is a good friend of mine , showed me a copy of your July-August issue in which another reader requested information about "spark erosion" machining. I have built several of these machines with considerable success and would be happy to share the knowledge gained. There are several classes of "spark erosion" machines and your reader seems to be familiar with the "Tap Buster" variety. Such a machine is very simple and crude and can be readily constructed in a home workshop. The machines I have built are classed as capacitor discharge micro-erosion machines. They are extremely slow and produce a fine matt finish to very close tolerances. I am presently experimenting with a third class of machine that cuts rather faster but needs rather sophisticated electronics to keep it under control.

To give you some idea of the capabilities of my machines, three jobs come to mind:

- A 3/16" tapped blind hole in a 10mm ball bearing in a hardened state
- A 4mm splined hole through a 10mm square tungsten carbide cutter insert
- A 3mm hole through a flat file at 45° in the hardened state

For me, an electronics engineer, the mechanical aspects of these machines present the greatest problem. Another good friend of mine, a mechanical engineer has constructed the mechanisms while I have devised and constructed the electronics. We have had in mind for some time to build a simple (and relatively fast) "Tap Buster". This project may have some interest amongst your readership. If so perhaps I could be contacted with a view to defining the requirements.

Graham Lill

Tasmania

*(Anyone who is interested, or who wishes to provide information to Graham, may contact him via the AME office ... Ed.)*

## Letterbox Contributions

You are welcome to send letters by mail to: PO Box 21, Higgins, ACT, 2615 or
fax to: (02) 6254 1641 or
e-mail to: **ame@dynamite.com.au**

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion — as long as they are not libellous — will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult to interpret. Due to popularity of Letter Box and limited space, letters of **400 words or less** will have a better chance of being published.

## Ball valve seats — still!

Sir,

I have read with interest the two articles by Peter Dawes on Ball Valve Seats, and the letter by J W Gibson in which the question of throat area of a ball valve was mentioned. The lift required to provide a throat area equal to the cross-sectional area of the seat was the problem. The good news is that there is a formula for this which is, for a 90 degree seat contact of the ball:-

Lift = L = .295D where D = dia. of ball

To obtain this formula is not exactly straightforward, but commencing with the surface area of the frustrum of a cone (Fig 1)

Surface area = A = $\pi(a+b)l$

But a = BC = Rsin$\theta$ (Fig 2)

b = Rsin45 = .707R

l = h/cos$\theta$ (Fig 1)

Therefore $A = \pi R h(.707 + \sin\theta)/\cos\theta$ .....(i)

Also, AB = QN - BC = Rsin45° - Rsin$\theta$

(triangles OGN and OBC)

= R(.707 - sin $\theta$)

and from triangle APB,

$\tan\theta = AB/AP$

= R(.707 - sin $\theta$)/h

therefore h = R(.707 - sin$\theta$)/tan$\theta$.....(ii)

Substituting in (I), $A = \pi R^2 (.5 - \sin^2\theta)/\sin\theta$

But Area of Seat = $\pi(.707R)^2$

$= \pi R^2/2$

Therefore $\#R^2(.5 - \sin^2\theta)/\sin\theta = \pi R^2/2$

and $1 - 2\sin2\theta = \sin\theta$

$\sin\theta = .5 \quad = 30°$

Substituting in (ii),

h = R(.707 - sin 30°)/tan 30° = .359R

Lift of Valve = L

= h + AQ

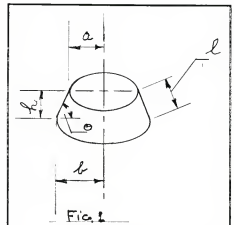
= h + (Rcos30° - Rcos45°) .359R + .159R

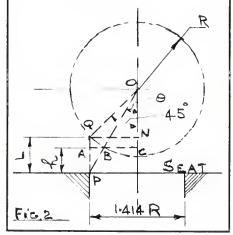
= .518R = .259D

The derivation of the formula is an academic exercise, but the result is useful in confidently limiting the lift of the ball at the commencement of the suction stroke, and to avoid undue hammering of the seat.

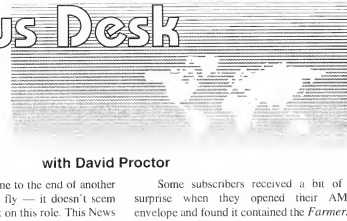
Alan Austin

New South Wales



# News Desk



**with David Proctor**

Hello and welcome to the end of another year. Time sure does fly — it doesn't seem like a year since I took on this role. This News Desk is shorter than usual due to lack of space, and anyway, I am sure you will find the rest of the magazine more interesting.

Some subscribers received a bit of a surprise when they opened their AME envelope and found it contained the *Farmers' Newsletter* instead of the September issue of this magazine. Apparently the other magazine is placed in envelopes and mailed by the same people who do AME and one of their people got a few mixed up. Let's hope the farmers who received AME decide to subscribe!

While on the subject of subscriptions, ***if you are moving address, please tell us***. We regularly receive magazines returned by Australia Post and marked "Left Address".

One of our long-term subscribers and contributors is shortly releasing a book which will be of great interest to narrow gauge fans and Tasmanians. Watch this space!

The response from clubs in updating their records for our Club Listing has been very good. Have we got yours yet?

On behalf of everyone involved with AME, I wish you all a happy and safe holiday season and lots of success in the workshop.

# Classifieds

### Traditional English Traction Engines

- Drawings, castings, accessories for 3" to 6" scale. Complete boilers supplied with pressure certificate. Machining and gear cutting service available. Send an A$10 bill (or alternately quote credit card number and date of expiry) for catalogue and price list to:
  **Live Steam Models, Unit 7, Old Hall Mills, Little Eaton, Derbyshire. DE21 5DN. UK.**
  **Phone**: ISD+44 1332 830811. **Fax:** ISD+44 1332 830050
  **e-mail**: livesteammodels@zetnet.co.uk or
  **visit our website**: www.livesteammodels.co.uk

### 5" gauge 0-6-0 Simplex loco for sale

- in excellent running order. Green with brass trim. Rigged for night running. Copper boiler with certificate. $4500. Telephone Steve (03) 9748 2623 or e-mail: sallyh@hotkey.net.au

### Garratt 0-4-0 + 0-4-0 for sale

- 7¼" gauge, freelance, OH&S cert. steel boiler. $17,750. Can be seen at EMCO. 247 Rawson St. Auburn. Ph. (02) 9648 4377

### Mechanical Design and Drafting Service

- Mechanical drafting on CAD printed on A4 and A3 paper. Other sizes on request.
  Stress and design analysis service for machine and machining elements including shafts, keyways, bearing applications, spring requirements, minor steel structures etc.
  Phone Brett Laughton (Dip. Eng.) on (02) 4955 0808

### Lathe and milling machine for sale

- Elliott 15M 3-phase 4.5HP. 15/48 20/1650 RPM $5300 ono. Tom Senior Major 31/6½ 50/1660 RPM 3-phase 2HP. $4300 ono. Phone (02) 9456 4535

### Myford ML7 Lathe for sale

- Excellent condition. Includes all toolng. 3- & 4-jaw chucks, change gears, fixed and travelling steadies, stand and manual. $2600. (02) 9952 3915 (AH) ask for Ben

### Wanted to Buy magazines

- The following magazines wanted to complete a collection. *Model Engineering Workshop* Vols #2. 4. 5. 7. 8. 9. 13. 15 and 41 *World of Model Engineering* Vol #3. Will pay by issue plus postage or as desired. Please contact Russell Dunn (03) 6446 1488 (BH). (03) 6446 0012 (AH). or Fax: (03) 6446 1474 or e-mail: russelld@webnet.com.au

### Lathe Mill Drill Hafco AL280P for sale

- Purchased new Jan 1998. Includes all standard accessories plus L262 Stand, 4-jaw chuck, spare belts. Used for hobby work only. $1900. Contact Mike Stringer 0418 675 634

### 7¼" gauge 0-8-0 *Caribou* for sale

- Excellent condition, 1 year old. Powder coated satin black finish. Brass tender. Complete with trailer and two workshop trollies. $25000. Contact Norm (08) 8243 0448

### Hunslet locomotive castings for sale

- 7¼" — 1/3 full size 0-4-0 saddle tank Hunslet locomotive castings, also castings for diamond stack, together with complete set of drawings, over 30 sheets. Price $850. Contact Tony Richardson (03) 9795 3695

# Subscribers Free Market

### FOR SALE

Almost complete set **castings** for **Wato *L'il Lima*** loco minus headlight and bell stand $1000 ono. Ph. (08) 9375 1223 or Fax (08) 9375 2340

**Norton tool and cutter grinder**, can grind cylindrical and surface, 240 volt excellent condition $750. Stephen Williams (02) 6351 4627

**Fowler traction engine plans** 7 NHP single cylinder 2", unused. cost $150 sell $100. Graham (03) 6229 7815

**5 Duplex Pumps** machined, steam and water, cylinders ⅝" & ½", also between spacers. No ports drilled. One set drawings (15 sheets) $100 the lot plus freight. E J Murrell (03) 5795 3705

**C38 castings and drawings** for sale (E & J Winter), incl.W Sandberg cylinders. $1150. Call Spiro (02) 9823 7672 anytime.

**Mechanical lubricator**, new, ex UK. Too large for 3" scale traction engine, suit 4½"/6". Top quality. $150 Ph. Mike (02) 6559 9504

### WANTED

**Information, manuals, literature** to help restore *Lorch* watchmakers lathe approx. 40mm centre height, 100mm between centres, round bed. (07) 4632 1683

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- Maximum of twenty words, including your contact name, phone number or address.
- Posted, on special form provided. No faxes please.
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

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**South African Winter Steam ..... $44.95**
A look at reopened narrow gauge ex South African line in the east of the country and various Garratts hauling heavy coal trains on private colliery lines. All filmed in the spectacular winter months. 55 minutes.

**Steam Fever ..... $44.95**
Another South African video which looks at various aspects of mainline operations in the final days of steam, including "Red Devil" and a look at the Class 25 condensing locomotive.

**Superlatives In Steam ..... $44.95**
Shows some of the worlds largest steam locomotives in preserved working order on U.S. railways. Video includes shots of Nickel Plate Berkshire 2-8-4 no.765, Norfolk and Western 'J' Class 4-8-4 no.611 and Norfolk and Western 'A' class Mallet no.1218, said to be the most powerful steam locomotive still in working order in the world. Scenes on the footplate during running and detailed segments of the two year restoration of 1218 are also included.

**Challenger Through The Rocky Mountains ... $44.95**
This video records the 1991 trip across the US by Union Pacific 4-6-6-4 Challenger no.3985 and 4-8-4 Northern No. 844 from Wyoming to Sacramento, California. Cold conditions add to the spectacle of preserved super power at work.

**24 hrs. of Live Steam ..... .$24.95**
An A N P production showing 5"gauge live steam locomotives in action hauling heavily loaded trains of between one and two tonnes on the Illawarra Live Steamers track at Wollongong. Action includes NSWGR 35, 36, 38, 50 and 59 class locos along with shots of Simplexes, Blowflys and Sweet Peas.

**Magic of Steam ..... $44.95**
A 40 min. EK video look at East German preserved steam at work in revenue service during 1989.

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A one hour video featuring mostly 1970s footage of the South Maitland Railways at work. A rare and historic insight into the workings of one of Australia's larger private railways.

**Milestones in Railway Preservation (Australia) $54.50**
Written and directed by Graeme Belbin. Subjects, from Qld's 130 year old A10 No.6, to a Victorian R class leading 3 diesels on a 3200 ton night goods from Bendigo to Melbourne. Footage includes 3830 as well as rare archival scenes such as tripple headers out of Lithgow in the 1950s and black 3801's supposed last run. Duration: 90min.

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# HERE'S THE GIFT TO GIVE!!

## (These videos will keep him quiet for hours)


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**AUSPLOUGH '97** — The rural vintage festival. Including the 44th World Ploughing Contest held at Deakin University Geelong during April 1997.


**FARM MACHINERY IN ACTION** (at Smith's Steam Day) — This is a real turn-back-the-clock where nine traction engines rolled up to show their colours. Also included is a thresher, large chaff cutter, small saw bench and a mill... all in operation using a portable steam engine and traction engine. A novel scene shows an air powered light!


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**MINIATURE TRACTION ENGINES** — The wonderful world of miniature traction engines. See how small they are, the attention to detail and the power these miniatures have. Set in the delightful surrounds of the Walka Water Works at Maitland NSW.

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**HOPETOUN** (Victoria) — Set on the shores of Lake Lascelles in the Mallee country of Victoria, this video looks at a mixture of rare and very rare engines. Also shown is a military vehicle and a cruise on the lake in a steam launch.

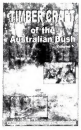

**BUSSELTON** — Our top seller. The sixth National Rally held in Western Australia. Stationary engines, tractors, bulldozers, and more.


**POWER OF THE PAST,** (Vol.2) — Still at Mt. Barker (SA), this video features a variety of products from the International Harvester Company.


**RUSTY IRON RALLY** — Features tractors, stationary engines, steam engines. bullocks Vs tractors in a tug of war and lots more. Very popular.


**STEAM POWER IN AUSTRALIA** (Vol.1) — Features steam engines of many types including traction, rollers, trains, steam face shovel, trucks and more. Over 20 items.


**INTERNATIONAL HARVESTER** (Vol.1) — A must for the International enthusiast. This video features buggies, bulldozers, tractors, trucks, utes and Scouts. See over 40 of the 70 International units at a get-together at Broken Hill. Enjoy the discussion by the owners detailing the history and restoration of their machines.




**TIMBER CRAFT of the Australian Bush** (Vol.1) — The days of horses and their uses in the logging industry of days-of-old come to life in this video. Once the logs come out of the bush it's time to split them up, make strainer posts, fence posts, shingles etc., you'll see how it was done. Commentary throughout.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# Australian Model Engineering

# 42218

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**42218 — the construction series prototype**

NSWSRA 422 class 5" gauge battery-electric locomotive built to 1-1/8" scale. The original locomotive as described in AME. Includes two 90 a/h batteries, battery charger and steel security frame for storage and transport which fits in a standard 6'x 4' box trailer.

Since completion, 42218 has been re-motored with two new permanent magnet 24 volt, 600 watt motors. Also included is a new control circuit — a Curtis fully protected controller which has adjustable power-up ramp similar to Model Railroad inertia control. A feature of the new controller is the excellent regenerative braking! An ideal passenger hauling locomotive with an 8 km/h speed limit. Rated hauling capacity is four standard 5' straddle type passenger cars.

Ease of use makes this the ideal locomotive for training new drivers. Ever-ready with minimum preparation time — 42218 can be used as first-on-last-off power on club days. You'll never have to worry about total fire ban days again!

**Tender closing date: 31 January 1999**

**For viewing and test drive Phone:**

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